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THE JOURNAL OF THE BOTANICAL SOCIETY OF SOUTH AFRICA

Edited by R. H. COMPTON, M.A., F.R.S.S.Af., Hon. Director, NATIONAL BOTANIC GARDENS :: :: :: KIRSTENBOSCH :: :: ::

Part XI. 1925

Published under the authority of the Council of the Botanical Society

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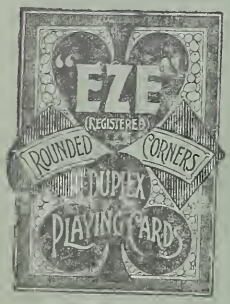

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The Journal of the Botanical Society of South Africa

EDITED BY R. H. COMPTON

PART XI 1925

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News and Notes.

THE Membership of the Botanical Society continues to increase, there having been a net increase in all classes of members during the year. The following table shows the growth of the Society since its foundation:—

	Life	Family	Ordinary	Associates	Total
1914 ..	.. 33	32	264	33	352
1915 ..	.. 46	26	263	32	367
1916 ..	.. 49	26	264	45	384
1917 ..	.. 46	24	249	53	366
1918 ..	.. 49	28	281	78	436
1919 ..	.. 50	38	320	84	492
1920 ..	.. 54	45	384	237	720
1921 ..	.. 54	48	407	287	795
1922 ..	.. 55	52	418	301	826
1923 ..	.. 59	50	405	269	783
1924 ..	.. 62	57	455	313	887

The 1924 figures show a considerable improvement on those for 1922, the previous maximum, and the membership is now within easy reach of the first thousand. If every Member were to make *one* effort to obtain a new Member the thousand should be quickly surpassed: and surely this is not too much to expect. The Hon. Secretary will be most pleased to send application forms to any whose names are suggested by Members.

* * *

The number of visitors to Kirstenbosch is increasing rapidly. A record of persons entering the gates on Saturday afternoons, Sundays and Public Holidays has been kept for several years: the total for 1924 was 43,619, as against 29,241 in 1923, an increase of nearly 50 per cent. This is due to the increased attractiveness of the Gardens, combined with greater ease of access and improved amenities for visitors.

* * *

The first permanent endowment of the National Botanic Gardens has been made by Mrs. H. le G. Solly of Sir Lowry's Pass, who has founded a Scholarship tenable at Kirstenbosch. The Scholarship is in memory of her late son, and is to be called after him the Edward Muspratt Solly Scholarship. Its value is £100 for one year, and it is renewable in special cases for a second year. Preference is to be given to an ex-pupil of the South African College School (where Edward Muspratt Solly was being educated) and of the University of Cape Town: and the holder must be one who, though not necessarily a graduate, shows special aptitude for Botany. The holder will be resident at Kirstenbosch and will engage in botanical research work under the guidance of the Director. It is expected that the first award will be made, if a suitable candidate is forthcoming, at the beginning of 1926. Sincere thanks are due to Mrs. Solly for her admirable benefaction; and it is to be hoped that this will be the forerunner of a long series of endowments, the need for which is very great.

* * *

Thanks to private benefaction it has at last been possible to appoint a Curator at the Karoo Garden, Whitehill. Mr. J. Archer, who has held the post since the beginning of the year, is one of the most enthusiastic and successful collectors and growers of the succulent plants of our arid districts. He is working single-handed at Whitehill, and has already made great progress in developing the Garden — laying out paths, collecting and planting specimens, etc. The Railway Department is giving valuable assistance and facilities in connection with Whitehill, and thanks are also due to Mr. J. D. Logan for his continued interest and help.

* * *

A donation of £500 from Sir Otto Beit together with bequests from the late Mr. C. W. Stegmann of Bloemfontein and the Cavanagh estate produced a fund of £700, to which Parliament has added a similar sum on the £ for £ principle. The £1,400 thus available is being used for the erection of Offices and Nursery Buildings. Attention may once more be called to the large part that private generosity has played in the development of Kirstenbosch: and while expressing sincere gratitude to our benefactors we must regret the necessary reliance of the Gardens — a national institution if ever there was one — on privately provided funds. Private generosity will always be most welcome, but the Government should at least ensure the continuance and development of the National Botanic Gardens quite independently of this source of funds.

* * *

When Kirstenbosch was first established as the Gardens a Nursery was made on the slopes to the right of the Fern Dell. This has been a convenient site, though suffering greatly from the proximity of the oaks: but now the development of the Gardens necessitates the removal of main nursery operations from this position; and the triangular area bounded by the Bishopscourt boundary, the

Bishopscourt Lane and the Rhodes Road is now being converted into the permanent Nursery. This involves the erection of a group of small buildings, and these are now being proceeded with. When complete they will enormously assist gardening operations, and a great improvement in display and rotation as well as in general management is to be anticipated.

* * *

The new Offices at Kirstenbosch will be in use by the time this JOURNAL appears, and the old hovel will mercifully be abandoned. The new building is situated in the new Nursery, nearly opposite the main gate of the Gardens, as shown in the accompanying plan. It is built in a simple style, the roof thatched and the walls whitewashed, the contractors being Messrs. G. Tout & Co. of Wynberg. The accommodation consists of the Clerk's Office and Library, the Director's Office (in which laboratory benches are being installed), and a dark-room for photographic work. The funds for the building have been derived from the sources mentioned above; and to our benefactors we are indebted for redemption from the long-standing disgrace of the old "Office," and for providing a building which will greatly facilitate the clerical and other work of the Gardens.

* * *

Owing to the generosity of Mr. J. B. Taylor, Kirstenbosch now possesses an experimental still and the building in which it is housed. The purpose of this is to enable distillations of essential oil-producing plants to be made. A number of such plants are in cultivation at Kirstenbosch — notably, Peppermint, various Pelargoniums, Roses, Lavender, etc., and these will be the subject of tests with a view to determining the quantity and quality of their products, and solving the question of their payability as crops. A number of indigenous plants, not hitherto examined from this point of view, will also be tested. The "distillery" is situated in the new Nursery and operations have been begun.

* * *

The transfer of the Bolus Herbarium and Botanical Library to the new building at Kirstenbosch took place in April, 1924.

* * *

Kirstenbosch continues to serve an important educational purpose in providing unrivalled opportunities for Nature Study. Miss L. Starke, the Teacher of Nature Study stationed at Kirstenbosch, takes classes of boys and girls round the Gardens daily during term-time, and also gives instruction to students of the Training College. The Gardens also supply material to the University of Cape Town for its botanical classes and research work: and the Nature Reserve is regularly the scene of University botanical excursions. No city in the world is educationally more fortunate than Cape Town in the close proximity of a great Botanic Garden and Nature Reserve.

* * *

The Kirstenbosch Tea House was opened on September 1st 1924, the lessee being Mrs. Key, and has proved a great convenience and attraction to visitors. It is possible to obtain light refreshments generously and daintily served at moderate prices, as well as excellent luncheons, and there is no more delightful place in the Peninsula in which to partake than under this massively pillared thatched roof among the oaks. The funds for the building were derived entirely from the public, through the Botanical Society, and the architects Messrs. Walgate & Elsworth kindly gave their services.

* * *

A public telephone has been installed at Kirstenbosch in close proximity to the Tea House.

* * *

A motor bus service has been instituted by Messrs. Ackermans of Claremont ('Phone: Claremont 522) and regular trips are made between Newlands Station and the Gardens at a charge of 1s. for adults, 6d. for children. This has proved of great assistance to visitors and to residents at Kirstenbosch, though the type of vehicle provided has not been wholly satisfactory. It is understood that an improved bus will be in operation in the coming summer.

* * *

From the scientific point of view, one of the chief *raisons d'être* of a Botanic Garden is the opportunity it offers for following the whole development of a plant at all seasons and of comparing it with other closely related plants grown under the same conditions. It thus becomes possible to discriminate between distinct species: for in the absence of such comparisons one cannot always be certain whether two distinct-looking plants are really different or whether their dissimilarity is due to different conditions of growth. Moreover it becomes possible to describe new species in a much more complete way than is possible when the material is confined to dead specimens which often do not show important features or stages in development: and material can be obtained for herbarium preservation with ease and certainty at the most favourable moments.

* * *

The useful part that Kirstenbosch is capable of playing in the development of systematic botany is shown by the number of new species that are being described from material cultivated in the Gardens. The last completed

volume (Vol. III.) of the Annals of the Bolus Herbarium contains descriptions of 39 new species of Mesembrianthemum from material cultivated in the Gardens, the author of these being Mrs. Bolus. The list includes some of the most charming species of this wonderful genus, some of which are certain to be widely cultivated: for instance *M. caespitosum*, collected by Mr. I. Rohland, formerly Ranger at Kirstenbosch, which is perhaps the finest carpet Vijge in existence; *M. anemoniflorum* collected by Mrs. Strangman near Hermanus with large flowers of a delicate and almost indefinable shade ("salmon" does not do it justice); *M. Peersii*, named after its discoverer, Mr. V. S. Peers, who collected it at Graafwater, the flowers of which are curiously soft in form and go through a series of delicate tints from orange through pink to rose; and many others of hardly less merit.

* * *

The same volume contains descriptions of four new Watsonias from Kirstenbosch-grown material. These include the splendid *W. Galpinii* (see Mr. Mathews' article on a later page of this JOURNAL), the Gardens material of which was collected by Miss A. V. Duthie at Knysna; the large-flowered *W. Versfeldii* with its noble white variety (superior to the well-known *W. Ardernei*), collected by Mr. W. Versfeld at Piquetberg; and the familiar and beautiful apricot Watsonia so plentiful on the higher slopes of Table Mountain, but only recently discovered to be nameless — now *W. tabularis*. There are also new species of Homeria and Apicra.

* * *

At the British Empire Exhibition at Wembley in 1924 South African indigenous plants were well represented and aroused an enormous amount of interest. Weekly consignments of cut flowers were sent in cool storage from Cape Town through the Cape Peninsula Publicity Association; these arrived for the most part in absolutely fresh condition and were exhibited in the Cape Town section of the South African Pavilion. Mr. Dunsdon of Caledon, whose brilliant and original decorative work with wild flowers is well known, was responsible for the arrangement of the specimens. The flowers themselves were sent mainly from the country districts, but some consignments came from Kirstenbosch. It is interesting to note that many of the specimens so exhibited were added to the Kew Herbarium, some being new to or poorly represented in the collections.

* * *

Another most interesting feature at Wembley was the South African Rock Garden which was organised by Mr. Frank Frith, Railway Horticulturist, whose enthusiasm for the native succulent flora is unbounded. The Director of Kew (Report for 1924) says that this was certainly the most interesting of the plant exhibits at the Exhibition. Many thousands of people saw there for the first time the amazing plant-forms which are so characteristic a feature of our arid districts. It is a matter for congratulation that Mr. Frith's exhibit of Veld and Kopje is being repeated this year.

* * *

In connection with the exhibits of South African indigenous plants at Wembley, about 140 different varieties of seeds and bulbs were sent from Kirstenbosch to the Royal Horticultural Society. These were grown in the Society's Garden at Wisley, and were transferred to Wembley in due season, where they added to the display. It is interesting to notice that two of the species sent, viz., *Charieis heterophylla* and *Dimorphotheca pluvialis*, received awards of merit from the Royal Horticultural Society. Both of these plants will be well known to visitors at Kirstenbosch.

* * *

The Cape Peninsula Publicity Association has arranged for Professor Compton to deliver a few illustrated lectures on Cape Wild Flowers at the Wembley Exhibition this year.

* * *

An important amalgamation has been effected between three great botanical institutions in Geneva — the De Candolle Herbarium, founded by A. P. de Candolle, the Boissier Herbarium founded by P. E. Boissier, and the Botanical Observatory of the City of Geneva, based on the private collections of Baron de Lessert. The result will of course be greatly to the advantage of botanical studies and research at that important centre. An incidental result of the amalgamation is that a large number of books have been duplicated, and these have now been disposed of to the New York Botanical Gardens. The total weight of botanical literature thus set free to enrich the New York collection was about ten tons, and the purchase price was 72,000 Swiss francs.

* * *

The 14th Annual Report of the Brooklyn Botanic Garden (1924) has just been received. Some indication of the scale on which this vigorous institution is conducted can be obtained from its funds. The City of Brooklyn voted $87,310 for the year's maintenance — *i.e.*, about £17,500 sterling: and in addition the Gardens received an income from endowments and private sources of $52,780, or about £11,000 sterling. The total amount thus available for 1924 was therefore about £28,500 or

more than seven times the amount available for Kirstenbosch. The Brooklyn grant-in-aid is entirely municipal, the U.S.A. Government making no contribution to its funds; Brooklyn not being a national institution. The Brooklyn municipality contributes approximately twelve times as much to the support of the Gardens as the Union Government contributes to the support of Kirstenbosch.

* * *

As a result of the more adequate scale on which the Brooklyn Gardens are financed, combined with the energy and enthusiasm of their Staff, it is possible for them to render the most valuable services to the City. To take a few examples of the work of the year. Over 1,600 pages of research were published. Over 438,000 persons visited the grounds. Over 100,000 adults and children attended classes and lectures. Material was supplied to schools sufficient for over 161,000 pupils. Over 4,600 packets of seed were sent to other botanic gardens. Over 204,000 packets of vegetable and flower seeds were supplied to Brooklyn children for planting in school and home gardens. And so on. Truly the motto of the Gardens is being well observed — "For the Advancement of Botany and the Service of the City."

* * *

When one has read all that the Brooklyn Botanic Gardens have done one may be slightly staggered by the statement that there is an urgent necessity of an increase in annual income from permanent funds of not less than $100,000: yet the Director (Dr. A. Stuart Gager) makes out an excellent case for this increase, which it is to be hoped will be forthcoming. But the impression given by the Brooklyn Report to anyone interested in Kirstenbosch and with vision enough to see its wonderful possibilities is how woefully and shamefully under-financed are the National Botanic Gardens of South Africa.

* * *

In Sydney, New South Wales, there is a Horticultural Society under the auspices of the Teachers' Federation. This Society among other things encourages School Gardens, and organises garden competitions between the different schools. It holds an Autumn Show (the fourth annual show has just taken place) at which trophies and prizes are distributed to successful schools. The Education Department presents a championship trophy. There are prizes for flower gardens, herb gardens, domestic science gardens, and economic gardens. Of special interest is a trophy presented by the Australian Forest League for the best wild flower plot. It is reported that there was a high standard of entries and a large attendance. When shall we have proper school gardens in South Africa? It not this a matter that ought to be taken up seriously by the Education Departments and by the Teachers' organisations?

* * *

It is proposed by the Botanical Survey to establish a "Karoo Veld Reserve" in the neighbourhood of Fauresmith, O.F.S., and £750 has been voted by Parliament for the purpose. The Minister for Agriculture stated that this was in the nature of an experiment, but apart from this no other information is available as to the purposes of the Reserve or the way in which the money is to be spent. Professor Potts of Grey University College, Bloemfontein, who has interested himself in the matter, promised to write an account of it for this JOURNAL, after consulting his colleagues in the Botanical Survey: but unfortunately he is unable to do this until after we have gone to press. We make no comment, therefore, except to remark that the £750 voted would have been extremely useful in developing the Karoo Garden at Whitehill, which has subsisted entirely up to the present on private benefactions.

* * *

Of the few South African-born botanists Christiaan Hendrik Persoon is the earliest, having been born at the Cape 31st December 1761. His father, C. D. Persoon, was a native of Pomerania who had settled at the Cape and had married Elizabeth Wilhelmina Groenewald, the daughter of a Dutch burgher. The son left South Africa at the age of 13, however, and had a distinguished career in Europe, being one of the early workers in mycology. Details, as far as obtainable from the Cape Archives, have recently been published by Len Verwoerd of the University of Stellenbosch. It is unfortunate, perhaps, that Persoon's name should have been commemorated in one of the Australian, instead of South African, genera of Proteaceae, Persoonia.

* * *

The death of Miss Mary M. Page, which took place on 7th February, 1925, at the age of 57, creates a gap which it will be very difficult to fill. She was Botanical Artist at the Bolus Herbarium, with which she was connected for ten years, and during that time she made a very large number of drawings in line and in colour of new and little known species of South African plants. Her work is characterised by extreme care and attention to detail, and at the same time her line is so true and her colour sense so faithful that the paintings are not only invaluable from the botanical standpoint but are artistically satisfying. Members of the Botanical Society will miss the beautiful illustrations with which she enriched past numbers of the JOURNAL, and in appreciation of which

the Council elected her an Honorary Life Member last year. Never robust, she gave of her best to her work, often at the price of nervous and physical exhaustion. Her drawings are preserved in the Bolus Herbarium, and it is greatly to be hoped that they will eventually be published in worthy form.

* * *

We offer our hearty, if somewhat belated, good wishes to Mr. H. F. Henderson, V.C., and his wife, formerly Miss H. Joan Davison, who were married on 27th August 1924, and who are ranching near Bulawayo. Mrs. Henderson is a graduate of the University of the Cape of Good Hope, and was the first Secretary to the Trustees of the National Botanic Gardens. She held this post from the foundation of the Gardens until August 1920, when she accepted an appointment in the Division of Botany at Pretoria. All who know her will agree in congratulating Mr. Henderson and in wishing them every good fortune and happiness in the future.

* * *

On the 6th June at the Royal Observatory, the wedding took place of Mr. Frank Parker and Miss Violet Halm. The bride is the younger daughter of Dr. and Mrs. Halm of the Observatory. She was for some time connected with Kirstenbosch, first as a gardening student and then as Secretary to the Trustees. She held the latter post from May, 1921, to February, 1923, when she relinquished it in order to take a course at the University of Cape Town. In view of her intimate association with Kirstenbosch some sprays of *Serruria florida* were sent from the Gardens, and were used by her in her bridal bouquet. Mr. and Mrs. Parker are to live at Southfield and will devote themselves, among other things, to the cultivation of native plants, in which we wish them every success.

* * *

Mr. Duncan Baxter, Chairman of the Trustees of the National Botanic Gardens is paying a visit to Europe, and Sir Lionel Phillips is acting as Chairman during his absence.

* * *

Professor Compton, Director of the National Botanic Gardens has been granted leave of absence after six years' service, and is sailing for England on July 4th by the S.S. "Nestor," accompanied by Mrs. Compton and their two children. Professor Compton expects to return early in 1926. During his visit to Europe he proposes to make a tour of various botanic gardens, including those of La Mortola and the Villa Thuret where climatic conditions approximate to those at Kirstenbosch: and he also intends to study methods of production of essential oils and drugs at certain centres. He will also engage in research work at Kew and the British Museum. During his absence from Kirstenbosch, his financial and supervisional duties will be carried out by Sir Lionel Phillips and Mr. F. E. Cartwright.

* * *

A step of great importance has been taken by the Cape Provincial Council in connection with the Protection of Wild Flowers. Existing legislation had become a dead letter in practice, owing to the profitable nature of the traffic in protected flowers which enabled the offenders to pay their fines comfortably. During 1924 - 25 the amount of destruction that took place was probably greater than in any previous year. The Provincial Council has now passed a new Ordinance which will, it is hoped, put an end to the pitiful farce. It will now be possible for the police to seize protected flowers exposed for sale at the time the seller is apprehended, and for the magistrate to confiscate them. It will be possible for the magistrate to inflict severer penalties, graded according to the number of offences: and in the case of repeated violation of the law he may suspend the offender's wild flower licence. These new provisions, if enforced by the police and the magistrates, will certainly result in the stoppage of the illicit sale of protected flowers — provided one important problem is faced. This is the case of the "cultivated" wild flower.

* * *

Nothing in the Ordinance prevents the sale of protected flowers by the owner of the land on which they grow, or by the cultivator or their agents. The prohibition therefore only affects flowers gathered on Crown Land and on private land without permission. The onus is on the seller to show that he is in lawful possession of the flowers. Clearly therefore, the police and magistrates will demand permits from those suspected of an offence and landowners will have to furnish sellers with such permits if they wish to shield them from conviction. It will be to the advantage of the owner to make the permits clear, for definite kinds of flowers, and for a limited period.

Everything, however, will depend on the way in which the magistrates administer the law: and it seems certain that now they will have public opinion strongly in their favour if they use the powers entrusted to them effectively to save our priceless floral heritage.

* * *

A number of omissions are being made in the Schedule of Protected Flowers partly with the object of removing administrative difficulties, and partly because it was felt that many flowers on the list are in no need of protection.

It is hoped that these alterations in the law will cause it to be respected and to be an effective aid towards the desired end.

* * *

It is good news that the Government is taking steps to consolidate and preserve the great Sabi and Shingwedzi game reserves in the Transvaal as a National Park in which the last remnants of our slaughtered fauna can find a permanent refuge. There is an article on the subject by Colonel Stevenson-Hamilton, Warden of the Reserve, in the S.A. Journal of Industries for March, 1925, which gives an excellent idea of the country and the problems involved.

It is sincerely to be hoped that the problem of the Addo elephants will also be solved in a similar way — that is by creating a reserve for them in which there is adequate access to water. The destructive habits of these elephants, which led to the shameful demand for their extermination, are almost entirely due to the fact that they were deprived of water and had to forage for it. Reference may be made to Colonel Deneys Reitz's eloquent appeal in a recent issue of the "Cape Argus."

* * *

The attention of the public is gradually being awakened to the menace of bush-fires and veld-burning to the interests of the country as a whole. A handful of ignorant stock-farmers (to give them too dignified a name) are destroying our natural wealth, scenery, water supply and wild flowers. They do not benefit themselves in the long run, and they injure everyone else. The doctrine of *taissez-faire* has produced no more scandalous result than this. Legislation and departmental regulations — preferably on some such lines as recommended by the Drought Commission — should no longer be delayed. Every day the country is becoming poorer, less habitable, less beautiful. None of the problems confronting South Africa is more urgent than this: when will it be taken seriously? Bush-fires can never be entirely prevented: but every effort should be made to minimise them. Therefore (1) prohibit all grazing and wood cutting on crown and municipal lands, and stop the system of leases for this purpose; (2) define catchment areas and prohibit grazing therein, with suitable compensation; (3) make it an offence for a land-owner or tenant to allow a fire to spread from his own property to that of his neighbour, without the neighbour's consent.

* * *

We publish an article by Mr. Mathews, Curator of Kirstenbosch, on some of the noteworthy native plants which have been brought into cultivation at the Gardens and which are not yet generally grown. The plants he describes are all excellent garden subjects, easy to grow and highly decorative in form and colour: moreover some of them have the valuable property of filling in a flowerless gap in the succession of the ordinarily grown exotics.

* * *

Professor Adamson of the University of Cape Town contributes an illustrated article on the native vegetation of Kirstenbosch, looked at from the ecological point of view: that is, the plants are regarded in their "social" aspects, as components of "plant associations" with definite relations to the environment and to one another. The Upper Kirstenbosch Nature Reserve is a particularly favourable area for studies of this kind, as apart from the occurrence of occasional bush fires and the invasion of a few pines, the vegetation is in a very natural condition. Professor Adamson, who has wide experience as an ecologist, is particularly well qualified to contribute an article on this aspect of the subject.

* * *

The Heaths or Ericaceae are so characteristic of the flora of the Cape, and make such a strong appeal both to the botanist and amateur that we make no apology for publishing, with all due modesty, an article to serve as a guide to the Ericaceae of the Cape Peninsula. Notes are also given on the Heaths personally observed in the Kirstenbosch area. It is hoped that the article will be of service to students and collectors, to whom the use of the giant analysis and keys in the Flora Capensis presents formidable difficulties.

* * *

Eight and a half years after the death of Harold Pearson, first Director of the National Botanic Gardens, his memorial is approaching completion at Kirstenbosch. The Hostel which is to bear his name is described on another page, and a perspective drawing by Captain Elsworth (of Walgate and Elsworth, the architects of the building) is reproduced as Plate III.

* * *

Shortly after the Gardens were founded, a survey of Kirstenbosch (*sensu strictiore*) was undertaken by the Civil Engineering Department of the University of Cape Town. The scale was 80 feet to the inch, and contours 10 feet apart were included. This plan has recently been revised by the Department, in order to include the development which has taken place. The plan reproduced in this part of the JOURNAL is founded on the revised survey. Its scale is 400 feet to the inch, and the contour lines are at 50 feet intervals. The Survey still includes only the old Kirstenbosch Estate, no details being shown in the Klaassenbosch Annexure nor in the Upper Kirstenbosch Nature Reserve.

It is interesting to compare this new plan with the sketch plan published in the 1918 issue of this JOURNAL, and such a comparison enables one to form an idea of the progress made during the last seven years. At the same time, the plan gives no idea of the detailed work that has been put into the Gardens — the furlongs of properly made paths, water-pipes, storm-water drainage, and the greatly improved maintenance of the collections.

Will the next ten years render this plan obsolete? We think so. The gaps and incompletenesses, obvious on the plan as in the Gardens themselves, are waiting to be filled: development is necessary in every direction. It is all a question of adequate finance.

Progress at Kirstenbosch.

THE following summary of work done in the Gardens during 1924 is recorded for the information of Members of the Society who are unable to keep themselves acquainted with the progress by frequent visits to Kirstenbosch.

On the east of the established Proteas a further area of about half an acre has been cleared of scrub and planted with seedling Proteaceae. The south bank of the Horse Shoe Path near the present offices has been trenched for 100 yards and an average of 3 yards wide, and several dwarf or procumbent Proteas massed along it. A total of 600 seedlings, including additional species to the collection, were put out.

In the Heath Garden 200 seedlings were added to existing masses or planted between them. On the North side a further area, about a third of an acre, was cleared and planted with 500 seedlings raised in the Nursery and 250 collected small plants of Kirstenbosch Heaths.

The renovation of the Daisy Garden has been effected by lifting all the small plants, top-dressing with virgin soil, fertilising, and forking over the ground. The lifted plants, being mostly perennials, were divided up, and planted back in masses of species. On the remainder of the ground seedlings of annual species of Ursinias, Felicias, Dimorphothecas, etc., were planted, and the spaces between the perennials filled up with Bok Baai Vijges. A total of about 12,000 plants was handled, and resulted in the most effective masses of whites, yellows, oranges and blues so far obtained in the Gardens.

In the Aloe Kopje, at the front, five species of Nemesias were planted in sheltered spots, and on the top a space was prepared for a small collection of kopje plants from Saldanha Bay. Further back, on the level stretch, a surplus of 3,000 Charieis and Ursinias were planted. Along the Lachenalia path about 300 bulbs in several species were added to the collection. On the lower side of this path the stones have been re-arranged to bank up the soil, which has been improved by the addition of virgin surface soil.

On the Terrace two round beds have been filled with *Phygelius capensis* and *P. aequalis*, separately, and two long beds of both *Diascia Barberae* and *D. rigescens*. The two round beds of *Plectranthus Ecklonis* have been lifted, thinned out, and replanted after improvement of the soil. The triangular bed at the Terrace was planted with 400 East African Delphinium in the centre, and sown with the South African Poppy around the outside.

Four clumps of distinct species of Statice have been planted in the Podalyria bed, and the remaining ground filled up with 2,000 *Dimorphotheca aurantiaca* hybrids, which made an effective display. The Gardenia bed has been filled up with a white variety of *Dianthus incurvatus*. Nineteen large flat stones have been obtained from surplus boulders around the Heath Frames, dressed, and placed in positions to form seven effective crossings over the streams on the lawn.

On vacant ground between the Buchu and Olives 13 rows, 42 yards long, were sown of Colocynth, and a stand of 35 *Rhus coriaria* planted out. Below the Olives 420 square yards were planted with Black Peppermint. To the Economic Trees were added 3 plants each of *Acacia Giraffae*, *A. catechu*, *A. Farnesiana* and *Sassafras officinale*, 2 of *Prosopis Kirkii*, and 1 of the Mexican Sapodilla. In the Orchard 10 square yards each were sown of Linseed, Caraway, Aniseed, and Opium Poppy, 60 square yards each of Chamomile, Pennyroyal, Valerian and Dalmatian Insect Powder planted out on prepared beds, 50 square yards of Foxgloves, Lavender, and Datura Metel. Smaller stands have been planted or sown of Japanese Wine Berry, Indian Fennel, *Aralia cordata*, and several South African mints. A few plants of *Cyclopia Vogelii* and *C. genistoides* were added to the Bush Teas.

A crop of 303 lbs. dry weight was harvested of Black Peppermint, 574 lbs. of *Barosma betulina* and 407 lbs. of *B. crenulata*. A heavy crop of Colocynth fruits was obtained, of which the greater portion was peeled, sliced, and dried, yielding 93 lbs. for sale. Three Olive Trees

bore 32 lbs. of ripe fruits. Two trees of the "Locust Bean" bore a few pods, the majority of the trees are however males. These trees were raised from seed in the Nursery and planted out in 1915.

The floor of the "Wendy House," the new tool shed near the Stone Pine on the Aloe Kopje, has been paved and grouted in cement. A wooden partition closing off 6 feet for a store, work benches, foot boards, and wall battens for tools have been fixed. A yard 48 ft. by 30 ft. has been enclosed with a 7 ft. spar fence with gates at each end. A garden frame, 16 ft. by 6 ft. has been built with concrete walls, 2 ft. 6 ins. at the back sloping to 18 inches at the front. Adjoining, a skeleton frame of jarrah, 18 ft. by 6 ft. 6 ins., has been built for hardening off Heaths, especially raised in the garden frame. The remainder of the ground has been graded for standing plants when ready for the open air. All paths in the yard have been gravelled and rolled firm.

The Horse Shoe Path, starting near the Rustic Bridge in the Dell, and following the brow of the Cycad Amphitheatre round to a point near the present offices, on the opposite side, has been cut out 12 ft. wide and graded to passable levels. The full length is now a quarter mile. The excavated surface soil has been used to grade up the trenched ground around the brow which has been fertilised and partially planted with masses of Arctotis, Gazanias, Scabious, and a few available shrubs. Along the edge of the path for 400 yards a row of mixed *Sparaxis tricolor*, and two rows of Bok Baai Vijges were planted. The latter resulted in an effective band of varied colours.

The Juniper hedges and stone kerbings of the path leading past the Grave have been extended 33 feet to join up with the Horse Shoe Path. On the outside of these hedges about 500 seedling bulbs of Gladioli, and on the inside a similar number of Tritonias, have been planted. Among the grasses in the open spaces of the Cycads 5,000 seedling bulbs of Gladiolus spp. and 1,500 Ixia species have been massed.

In the Fern Dell the paths leading across the stream have been kerbed and paved, a length of 55 yards and average 4 ft. wide. Almost opposite, a section of the Horse Shoe Path, 60 ft. long, has been kerbed and guttered on each side, to a point opposite the new tool shed, a stone foundation laid, surface napped and blinded with gravel.

The permanent Nursery site has been enclosed with a seven strand barbed wire fence on iron standards with 4 ft. wide netting inserted 2 ft. below and 2 ft. above ground to exclude moles and dogs. Along the North boundary a hedge of 750 seedling *Royena lucida* has been planted on the prepared trench, and along the Eastern boundary, a hedge of 1,000 *Plectronia ventosa* seedlings. Along the Carissa hedge on the South-Western boundary a 5 ft. path has been cut out and graded, and along the Royena hedge a 4 ft. path. A sketch plan of the lay-out of essential nursery buildings has been approved and a start made on the foundations of the Store and Chalets. Besides these the scheme includes a Succulent House and Frame with potting shed attached, a Propagating House and Frame with a Potting Shed, Packing Shed and an Office adjoining. Water has been laid on to the site from the main at Skeleton Stream Bridge, where the pipes have been removed from under the bridge, and re-laid along the road. 950 feet of 1½ inch piping with 2 sectional valves and 15 tee pieces and plugs for future connections were required.

Water was supplied to the Pearson Memorial Hostel site by laying 500 ft. of 1½ inch piping with a 2 inch head and strainer leading from the dam in Window Gorge Stream.

Water was taken to the Ruins, the Tea House site, from the North end of the Terrace by laying 450 feet of 1½ inch main piping and a branch 170 feet of ¾ inch piping, with the necessary tee pieces and plugs for future connections and extension forward. The parapet wall of the Tea House has been restored for the 80 ft. along the front and 2½ feet high. Periwinkle was planted on the wall as it was built. The space between the wall and the gutter and a five feet path along the West side to the back, have been gravelled. To give access from the Oak Avenue to the gravelled area nine stone steps five feet wide were made of selected flat stones. Under the oaks on the east 11 tables, 2 ft. 3 in. wide, and totalling 60 ft. in length, have been erected, with two opposite side seats to each. The ground around the tables has been given a coat of gravel.

The total number of seedlings, bulbs, and plants planted out during the year approximated 30,000, many of which were annuals of a showy and free flowering nature, and resulted in effective and varied colour masses, most pronounced from the end of July to October.

A total of 2,210 items was registered of seeds, bulbs, etc., sent in, and collected by the staff. The list includes 71 Heaths, 41 Proteas, 18 Leucospermums, 13 Leucadendrons and 2 Aulax, many of them being additional species to the collections.

Material of 457 plants flowering in the Gardens, or received in flower have been submitted to the Bolus Herbarium, and 385 named, 37 indeterminate from insufficient material, and 35 as evidently new species.

J. W. MATHEWS.

Kirstenbosch. June, 1925.

The Heaths of the Cape Peninsula.

THE coastal belt of the Cape Peninsula is remarkable for the enormous number of species which belong to the Heath Family or Ericaceae. In the great monograph by the late Mr. Guthrie, Dr. Bolus and Mr. N. E. Brown in the Flora Capensis — a monograph which is among the finest pieces of sustained, detailed and critical work of its kind — some 629 species are recorded as occurring in South Africa. Of these the great majority (469) belong to the genus *Erica*: the remainder (160) are grouped in 22 so-called " minor genera ". Since the publication of that work a considerable number of new species has been published: and there is no doubt that there are many others awaiting discovery. Many species are confined to a small area, and there are great parts of the Cape mountain ranges very imperfectly known botanically. Even in the Cape Peninsula six new species of Erica — some very showy plants — have been described during the last three years: and collectors on little-visited mountains are almost certain to come across novelties. Even if the plants are not actually new to science, they may be extremely valuable as filling up gaps in the known distribution, or as completing the scrappy material by which many species are represented in herbaria.

In collecting Heaths there is one pitfall which has to be avoided. For some mysterious reason a Heath in drying almost always sheds its leaves and flowers. This can best be prevented by plunging the specimen for half a minute in scalding-hot water. The specimen is then shaken out and dried between absorbent papers in the usual way.

Despite the enormous number of species of Ericaceae, and their exquisite beauty, it is surprising how little is known of them, and how little they are distinguished by people in general. One species, *Erica cerinthoides*, has attained the strange distinction of being " Erica " to the man-in-the-street, just as *Disa uniflora* is " the Disa " and *Rochea coccinea* " the Crassula ". All the other Ericaceae are vaguely " heath ". Of course there are many amateurs of the Cape flora who distinguish many of the more beautiful varieties, either by their scientific names, or by localities such as the Elgin, Riversdale or Tyger Hoek Heaths. The deliberately invented names of the wild-flower-protection schedule have hardly caught on, with the notorious exception of the " sticky pink "; it seems that vernacular names must have a " folk " origin — they must be born, not made.

In any case, vernacular names usually lag far behind the scientific ones, and cannot be used with any exactness: one and the same name is constantly used for different plants in different districts, and even in the same district. How many different plants are called Kapokkie or Aandblom or Bietouw or Rapuisbos or Mountain Rose in different parts of South Africa! Properly understood, the scientific nomenclature is a great help to the fuller study and appreciation of any group of plants. And in a country where a proper pride is taken in such names as van der Westhuizen and Pietpotgietersrust, no objection ought to be raised to the much milder botanical names on the grounds of being " mouthfuls ". If a plant has the good fortune to be called Zaluzianskya, it is because it commemorates the happy possessor of the noble name of Zuluziansky. Botanical nomenclature is really no worse than, say, the appalling jargon of the milliner or of the cook. Who would not prefer *Erica regia* to Winceyette or Veal Sauté?

To return from this digression, botanical nomenclature is as necessary an evil or a blessing as any nomenclature, and no apology is required for it. In what follows the scientific names will be used ruthlessly.

The Heaths of the Cape Peninsula are a very fair sample of the family. Excluding varieties, some 99 species of Erica have been recorded in the Peninsula, and 18 species belonging to minor genera. In Erica 29 out of the 41 sections into which Guthrie and Bolus divided the genus are represented. The species range from highly decorative long-tubed forms such as *E. Nevillei* and *E. gilva* with corollas an inch in length, down to *Scyphogyne trimera*, with a corolla only $\frac{1}{25}$ inch long. Some, such as *E. triflora* and *E. transparens*, are in form and colour among the most charming species of this amazingly beautiful genus. There is a wide range of habit of growth, form, flower-colour and time of flowering. No season of the year is without its Heaths in flower: but most of the lowland species flower between August and November, while the mountain species have their maximum between November and February. Most species have limited and rather definite flowering periods, but some — e.g. *E. Plukenetii* and *E. hispidula* — can almost always be found in flower.

Heaths can be found at all altitudes from sea-level to the top of Table Mountain, and they occur in a great variety of different habitats. They appear to shun the sea-shore and with the exception of stray plants of *E.*

strigosa they also avoid the evergreen forest of the ravines. Some few are typically swamp-plants, such as *E. curviflora* and *E. cyrillaeflora*. Some are constantly found in the crevices of moist shady rocks at higher altitudes, for instance *E. marifolia*, *E. petiolaris* and *E. depressa*. Most of them, however, are constituents, more or less abundant, of the scrub or maquis that clothes the open sunny summer-dry flats, slopes and plateaux: and their distribution is determined very largely by the character of the soil and by the humidity of the air. Many species only occur at altitudes above about 1,500 ft., where like the Anemone and the Blue and Red Disas, they are frequently drenched during the summer by the south-easterly clouds: such are *E. transparens*, *E. gilva*, *E. lutea* and *E. physodes*. Others prefer the lower altitudes, and for the most part undergo a period of rest during the hot dry summer months: e.g. *E. abietina*, *E. thymifolia*, *E. viridipurpurea* and *E. hirtiflora*. Several of this latter group are social in habit, growing locally in great abundance: and the same applies to the swamp-loving heaths. The majority of the species, however, occur as more or less isolated plants.

All Heaths are woody plants, their aerial parts living above ground for at least two or three years. A few species attain the dimensions of small trees: *E. caffra* for instance may have a trunk a foot in diameter, as in Orange Kloof, and may be 15 ft. high; while *E. catervaeflora* in Ark Valley may also become a small tree. Some are robust shrubs, such as *E. triflora* and *Philippia Chamissonis*. Some are low depressed shrubs, such as *E. Nevillei*, *E. sociorum* and *E. marifolia*. Some are trailing shrublets, creeping over the soil and rocks, for instance the dainty *E. oxycoccifolia* and *E. planifolia*. The vast majority, however, are erect shrubs of one to three feet in height — though owing to the prevalent bush-fires, to which Heaths are specially susceptible, few of them reach their full stature.

The leaves are almost always produced in whorls, the most frequent numbers in a whorl being 3 or 4. The numbers 2, 6 and 8 occur much less frequently, though characteristic of certain species: and more rarely still the leaves are scattered or irregularly arranged. The leaves are always small, rarely more than ½ inch in length, and always have an entire margin. In a few species (e.g. *E. planifolia*, *E. thymifolia* and *E. marifolia*) the leaves are flat, but in the majority of species they are sulcate, that is, the margins are reflexed and meet one another on the under side in the middle line. The stomata or pores through which the plant "breathes" and gives off water-vapour, and which occur on the under side of the leaves, are therefore largely shut off from the exterior, and the evaporation of water is thereby checked — an important thing in a periodically dry climate. It has been shown that the furrow between the leaf-margins opens more widely in wet weather than in dry.

The flowers are usually borne in considerable numbers and are on the whole small. The shape of the individual flower is very varied, but it always has a curiously neat appearance. The short-tubed species in particular suggest the ceramic art at its best, and many of them might have served as models for the amphorae of Greece. In all there is a singular simplicity and purity of line, and the various parts are arranged, as it were, with most meticulous exactitude. Every detail is exquisite: there is no exuberance, no floridity. Here is none of the Suleimanic glory of the lily, none of the bizarreté of the orchid, but rather the expression of the perfect beauty of geometry and craftmanship. The Heaths do not intoxicate the floral voluptuary: they have no wild extravagance of colour, few of them have perfume, and their form is of the simplest: it is to the cool critical vision and the well-ordered mind that they appeal. There is as much difference aesthetically between a Heath and, say, a Gladiolus as between Bach and Chopin or Botticelli and Watteau.

From this further digression one returns to remark that the Erica flower is typically built up on the basis of the number 4. There are normally 4 sepals, 4 petals fused more or less into a tube, 8 stamens arising below the ovary and not attached to the corolla, and 4 carpels in the ovary. In the minor genera there are variations on this same type of symmetry: the stamens are frequently 4 only and the ovary may be reduced to a single-cavity structure containing only one ovule. The tendency in these genera is towards simplification: some few of them have fairly conspicuous flowers in which reduction has not gone far (e.g. Blaeria which is practically an Erica with stamens reduced to 4). Others have reduced their ovary as well, so that it contains only a single ovule (e.g. Syndesmanthus). In others again the corolla becomes quite inconspicuous and the whole flower tends to become very small, (e.g. Philippia, Coccosperma, Salaxis); and this tendency culminates in the reduction of the petals to three in species of Scyphogyne. A remarkable feature of all the Ericaceae is that there is no tendency to unisexuality: the flower always contains functional stamens and pistil.

There is extremely little exact observation on record of the methods of cross-pollination in the Ericaceae. In many cases the pollen is dry and easily shakes out of the stamens, and the protruding and often somewhat enlarged stigma may catch it as it is blown about in the wind: the fact that wind-pollination may thus exist in brightly coloured flowers is a warning against the too facile theory that

flower-colour is an "adaptation to attract insects". Some long-tubed species, e.g. *E. purpurea* and *E. Plukenetii*, have been observed to be visited, and probably cross-pollinated, by sugar-birds: but there is a great deal more speculation than observation on this subject, and much of it is very questionable. For instance, the supposed connection between the curved tube of many Ericas and the curved beak of the sugar-bird breaks down through one of the few actual pieces of observation that we have. Scott-Elliott watched sugar-birds (*Nectarinia chalybea*) visiting the flowers of *Erica purpurea* at Wynberg Butts (i.e. Kirstenbosch), and states that "owing to the upward curvature" (i.e. the half-erect position of the flowers?) "the bird has to seize the branch above the flowers and suck them head downwards." But the corolla tube is bent *downwards*, so that its natural curvature is actually *opposite* to that of the bird's beak in the position in which it sits. The curvature of the tube is much more likely to be of the same nature as that which is so frequent in other long-tubed laterally-borne flowers, namely a response to gravity.

The viscid secretion on the corolla of many heaths is often stated to be a device for preventing unwelcome crawling insects from entering the corolla, while allowing flying insects to pay their visits and effect pollination. Now *E. Massonii* from the Caledon Division has an extremely sticky corolla, one inch long, of a dull brownish-red colour. Crawling insects are effectually excluded by the viscidity, but what insects are attracted? The adaptationists, looking at the brown-red colour, would say carrion-flies: but no carrion-fly has a tongue an inch long, as the length of the corolla tube would demand on the accepted view. This is typical of the dilemmas into which adaptationism leads us: and what is required in all cases is a lot of patient observation and no prejudices.

The fruits of Erica and some of the minor genera are dehiscent capsules. The corollas persist until the capsules are swollen and ripe, and usually split previously to or at the dehiscence of the capsule. The seeds are usually very small, oval, and dark brown or black.

There is no known method of vegetative reproduction, and the plants spread entirely by means of seed. Most of them are very "hard-wooded" and have no dormant buds, being killed therefore by burning or severe cutting back. Only a few species, notably *E. cerinthoides*, are able to sprout from the old stumps after being burnt back. Owing to the lack of power of vegetative reproduction and regeneration, most heaths are very susceptible to injury by plucking and by bush-fires: and many heaths have undoubtedly been exterminated or greatly reduced in abundance by these causes.

In the following pages an attempt is made to assist the student and amateur to determine the various Ericas growing wild in the Cape Peninsula. In the first place a Key is given to the Ericaceous genera of the Peninsula. This Key cannot be used in the field, as the genera are based on characters of the ovary and ovules for whose study careful dissection under a good lens is required. If a plant whose name is desired should have very small flowers, or less than 8 stamens, or a very small ovary, it will very probably belong to one of the minor genera, and should be taken to a dissecting microscope for examination with the aid of the Flora Capensis. If, however, it appears likely that the plant is a true Erica an attempt can be made to determine its specific name by means of the second key. In cases of difficulty, reference should be made to the Flora Capensis and to a Herbarium (e.g. the Bolus Herbarium at Kirstenbosch which has an unrivalled collection of Ericaceae, the Herbarium of the Botanical Department, University of Cape Town, or the Herbarium of the S.A. Museum, Cape Town).

KEY TO THE GENERA OF ERICACEAE OCCURRING IN THE CAPE PENINSULA.

(1)	Ovary 2-4-8-celled	2
	Ovary 1-celled	9
(2)	Ovules 2 or more in each cell	3
	Ovules solitary in each cell	6
(3)	Fruit dehiscent: seeds very small, thin coated	4
	Fruit not dehiscent: seeds relatively large, hemispherical, thick-coated	Coccosperma
(4)	Stamens normally 8, occasionally reduced	5
	Stamens normally 4, occasionally increased	Blaeria
(5)	Sepals equal: bracts 3 (rarely less): stigma various	Erica
	Sepals unequal: bracts 0: stigma peltate	Philippia
(6)	Stamens 5-8	Salaxis
	Stamens 4, rarely 3	7
(7)	Corolla 4, rarely 3-lobed	8
	Corolla 2-lobed	Sympieza
(8)	Calyx-tube absent, or up to ½ as long as calyx lobes	Acrostemon
	Calyx-tube as long as or longer than the lobes	Simocheilus
(9)	Ovary containing 2 relatively large ovules	Coccosperma
	Ovary containing a solitary pendulous ovule	10
(10)	Corolla ½-¾ inch long: stigma small	Syndesmanthus
	Corolla minute $\frac{1}{50}$-$\frac{1}{25}$ inch long: stigma relatively large	Scyphogyne

In the above key to the genera I have followed fairly closely the revised key given in the appendix to Volume IV., Section 1 of the Flora Capensis (p. 1,123). In the following key to the species of Erica I have used characters which can easily — and in fact preferably — be recognised in the field, provided one has a good hand lens and a small scale measuring fractions of an inch.

Such features as flower-colour which are of considerable diagnostic value are usually omitted in the keys in Floras, largely on account of the unrecognisability of colour in dried specimens: but in this key, which is intended for use with fresh specimens, colour is taken into account. The same applies to viscidity, easily recognised in fresh material, but often difficult to be certain about in dried specimens.

KEY TO THE SPECIES OF ERICA OCCURRING IN THE CAPE PENINSULA.

(1) Corolla more than ½ in. long, and more than twice as long as it is broad — 2
Corolla less than ½ in. long, or less than twice as long as it is broad, or both — 21
(2) Anthers very long, projecting far outside corolla — 3
Anthers short, not or scarcely projecting outside corolla — 5
(3) Anthers not terminal on the filaments **monadelphia**
Anthers terminal on the filaments — 4
(4) Leaves about ¼ in. long: bracts conspicuous and close against sepals **Petiveri***
Leaves usually more than ½ in. long, bracts small and separated from sepals **Plukenetii***
(5) Corolla more or less hairy or pubescent — 6
Corolla glabrous — 11
(6) Corolla markedly hairy — 7
Corolla slightly pubescent — 8
(7) Flowers clustered at end of stem; corolla broadest about middle, bright red **cerinthoides***
Flowers scattered; corolla broadest at mouth, curved, softly coloured **curviflora***
(8) Corolla bright red; sepals sticky **coccinea***
Corolla not bright red — 9
(9) Sepals sticky **onosmaeflora**
Sepals not sticky — 10
(10) Ovary 8-celled **verticillata**
Ovary 4-celled **brachialis**
(11) Corolla white or greenish — 12
Corolla yellow — 15
Corolla orange, pink, red or purple — 16
(12) Corolla markedly inflated **Halicacaba***
Corolla not inflated — 13
(13) Flowers sessile in a dense head **sessiliflora**
Flowers pedicelled — 14
(14) Sepals about ¼ in. long; bracts about ⅙ in. long **gilva***
Sepals about ⅛-⅙ in. long; bracts about $\frac{1}{12}$ in. long **mammosa var. albiflora**
(15) Flowers bright yellow in a long spike-like inflorescence; leaves in whorls of 4 **abietina**
Flowers dull yellow, mostly at the ends of branches: leaves in whorls of 6 **onosmaeflora**
(16) Corolla with 4 dents or grooves at base — 17
Corolla without dents or grooves at base — 18
(17) Bracts about ¼-⅓ in. long, close beneath sepals: flowers mostly towards ends of branches **quadrisulcata**
Bracts about $\frac{1}{12}$ in. long, widely separated from sepals **mammosa***
(18) Sepals hairy **coccinea***
Sepals glabrous — 19
(19) Ovary hairy **onosmaeflora**
Ovary glabrous or practically so — 20
(20) Flowers sticky; pedicels ½ in. long **Nevillei**
Flowers not or scarcely sticky: pedicels about $\frac{1}{12}$ in. long **purpurea***
(21) Sepals leaf-green or scarious, not specially conspicuous, usually much smaller than corolla — 22
Sepals coloured (or white) like the corolla, usually approaching or equalling it in length, and usually conspicuous — 78
(22) Corolla hairy or downy — 23
Corolla glabrous — 44
(23) Leaves flat, more or less open-backed, in whorls of 3 — 24
Leaves with reflexed margins nearly or quite meeting below, in whorls of 4 or 6 — 28
(24) Erect shrubs or trees — 25
Low-growing or straggling plants — 26
(25) Shrub 1-2 ft.; leaves about ⅛ in. long **pubescens***
Small tree; leaves about ⅓-½ in. long **caffra**
(26) Corolla about ¼ in. long **marifolia***
Corolla about ⅛ in. long — 27
(27) Anthers with spur-like appendages; leaves mostly more than ⅛ in. long **planifolia**
Anthers without appendages; leaves mostly less than ⅛ in. long **oxycoccifolia**
(28) Leaves in whorls of 6; inflorescence spike-like **empetrifolia***
Leaves in whorls of 3 or 4; inflorescence usually loose — 29
(29) Anthers with appendages — 30
Anthers without appendages — 42
(30) Corolla more or less 4-angled — 31
Corolla not 4-angled — 32
(31) Flowers densely clustered, corolla nearly ¼ in. long **catervaeflora**
Flowers not densely clustered, corolla ⅛-⅙ in. long **intervallaris**
(32) Corolla mouth distinctly contracted — 33
Corolla mouth wide open or scarcely contracted — 36
(33) Free part of corolla about as long as tubular part; stigma peltate **mollis***
Free part of corolla much shorter than tubular part; stigma knob-shaped — 34
(34) Anthers protruding from corolla **turgida**
Anthers not protruding from corolla — 35
(35) Flowers in clusters of 3; corolla narrow **parviflora***
Flowers in clusters of 4; corolla broadly ovoid **hirtiflora***
(36) Corolla mouth distinctly widened — 37
Corolla mouth scarcely widened or contracted — 38
(37) Erect shrub: flowers in clusters of 4 **pusilla***
Small sprawling shrub; flowers in larger clusters **distorta**
(38) Corolla $\frac{1}{12}$-$\frac{1}{10}$ in. long; small sprawling shrub **distorta**
Corolla ⅛-⅙ in. long; erect shrub — 39
(39) Flowers in clusters of 3; corolla narrow **parviflora***
Flowers in clusters of 4; corolla broadly ovoid **hirtiflora***
(40) Leaves in whorls of 3 — 41
Leaves in whorls of 4 — 42
(41) Corolla $\frac{1}{10}$ in. long; flowering about October **limosa**
Corolla ⅕ in. long; flowering about March **paludicola**
(42) Corolla ¼ in. long **cyrillaeflora**
Corolla ⅓ in. or more long — 43
(43) Flowers in groups of 4, abundant **pyramidalis**
Flowers solitary or in pairs, scanty **fontana**
(44) Corolla lobes spreading out flat — 45
Corolla lobes not spreading out flat — 46
(45) Leaves about ⅛ in. long; flowers delicate and very numerous **transparens**
Leaves about ¼ in. long **fastigiata**
(46) Anthers projecting outside corolla — 47
Anthers not projecting outside corolla — 51

(47) Leaves open-backed; low straggling plant **thymifolia***
Leaves with reflexed margins **48**
(48) Corolla sticky **obtusata**
Corolla not sticky **49**
(49) Leaves hairy **nudiflora***
Leaves glabrous **50**
(50) Stems hairy **paniculata**
Whole plant glabrous **capillaris**
(51) Corolla sticky **52**
Corolla not sticky **59**
(52) Corolla green or white **53**
Corolla pink, red or purple **54**
(53) Small shrub, pedicels less than $\frac{1}{4}$ in. long; corolla greenish-white **physodes***
Tall straggling shrub; pedicels more than $\frac{1}{4}$ in. long, corolla green **urna-viridis**
(54) Whole plant more or less sticky **55**
Leaves not sticky **56**
(55) Sepals broader at the top than at the base **clavisepala**
Sepals lanceolate, coloured **mucosa**
(56) Inflorescence spike-like **57**
Flowers clustered on long pedicels at end of branch **58**
(57) Corolla $\frac{1}{4}$-$\frac{1}{2}$ in. long **conica***
Corolla less than $\frac{1}{4}$ in. long **viscaria**
(58) Leaves whorled; corolla $\frac{1}{8}$-$\frac{1}{6}$ in. long **ramentacea***
Leaves scattered: corolla $\frac{1}{4}$-$\frac{1}{3}$ in. long **obliqua**
(59) Leaves scattered, not whorled; flowers in umbels **pilulifera**
Leaves in whorls of 3 (with occasional variations) **60**
More than 3 leaves in a whorl **65**
(60) Leaves open-backed **hispidula var. serpyllifolia**
Leaves with reflexed margins **61**
(61) Sepals red; corolla $\frac{1}{8}$-$\frac{1}{6}$ in. long **pulchella**
Corolla $\frac{1}{12}$ in. long or less **62**
(62) Stigma knob-shaped, not protruding from corolla **tenuis**
Stigma peltate, protruding beyond corolla **63**
(63) Flower with one bract **inops**
Flower with 3 bracts **64**
(64) Flowers in a spike-like inflorescence; corolla dull red or tawny; plant less than 1 ft. high **coarctata**
Flowers not crowded; corolla pale pinkish white; plant tall **hispidula***
(65) Leaves mostly 5 or 6 in a whorl **66**
Leaves constantly 4 in a whorl **69**
(66) Flowers in a dense spike; pedicels less than $\frac{1}{12}$ in. long **67**
Flowers not in a dense spike; if racemose the pedicels more than $\frac{1}{12}$ in. long **68**
(67) Spikes about 1 in. long; plant usually less than 1 ft. high **empetrifolia***
Spikes about 3 in. long; plant usually more than 1 ft. high **pyxidiflora**
(68) Plant very hairy: flowers axillary **amoena**
Plant glabrous; flowers in clusters of 4 **Fairii**
(69) Corolla more than $\frac{1}{4}$ in. long **pyramidalis**
Corolla less than $\frac{1}{4}$ in. long **70**
(70) Corolla more than $\frac{1}{6}$ in. long **71**
Corolla less than $\frac{1}{6}$ in. long **72**
(71) Large shrub or small tree; flowers numerous in irregular clusters **catervaeflora var. glabrata***
Small shrub; flowers in clusters of 4 or rather more **laeta**
Small shrub: flowers in dense heads **sphaerocephala**
(72) Glabrous throughout **73**
Stems at least hairy **74**
(73) Inflorescence raceme-like **Dodii**
Flowers in small umbels or groups of 4 **margaritacea**
(74) Leaves open-backed with glandular hairs **strigosa***
Leaves not open-backed; hairs not glandular **75**
(75) Stigma protruding from corolla **76**
Stigma not protruding from corolla **77**
(76) Inflorescence raceme-like; corolla more than $\frac{1}{3}$ in. long, bright red **intervallaris**
Inflorescence a copious panicle; corolla less than $\frac{1}{3}$ in. long, purple **viridipurpurea***
(77) Leaves glabrous; hairs on stems reversed **curvirostris***
Leaves more or less hairy; hairs on stem erect **subdivaricata**
(78) Calyx covered with long hairs **79**
Calyx glabrous or slightly hairy **80**
(79) Flowers green **capitata**
Flowers pink **bruniades**
(80) Corolla pink, red or purple **81**
Corolla white, green or yellowish **96**
(81) Leaves in whorls of 4 **baccans***
Leaves not in whorls of 4 **82**
(82) Leaves in opposite pairs (rarely whorls of 3 occur); corolla inflated at base, contracted at throat **tenuifolia**
Leaves in whorls of 3 (rarely opposite pairs occur) **83**
(83) Corolla more or less sticky **84**
Corolla not sticky **85**
(84) Style short; sepals sticky; corolla red; leaves $\frac{1}{12}$-$\frac{1}{8}$ in. long **brevifolia***
Style as long as corolla; sepals not sticky; corolla purplish or lilac; leaves $\frac{1}{6}$ in. long **chlamydiflora***
(85) Corolla widening to the mouth **cristaeflora***
Corolla not widening to the mouth **86**
(86) Corolla about $\frac{1}{4}$ in. long or more **87**
Corolla less than $\frac{1}{4}$ in. long **88**
(87) Inflorescence somewhat raceme-like **albens**
Flowers in terminal clusters **corifolia**
(88) Anthers protruding beyond corolla **89**
Anthers not protruding from corolla **91**
(89) Anthers with appendages **spumosa**
Anthers without appendages **90**
(90) Leaves usually $\frac{1}{4}$-$\frac{1}{3}$ in. long; corolla contracted round stamens **placentaeflora**
Leaves $\frac{1}{8}$-$\frac{1}{5}$ in. long; corolla not contracted round stamens **imbricata***
(91) Stigma showing at mouth of corolla or protruding **92**
Stigma well below mouth of corolla **93**
(92) Ovary glabrous **lucida**
Ovary rough or hairy **plumigera**
(93) Stigma 4-lobed **gnaphaloides**
Stigma knob-shaped or simple **94**
(94) Sepals only about half as long as corolla **articularis**
Sepals practically as long as corolla **95**
(95) Pedicels $\frac{1}{4}$-$\frac{1}{3}$ in. long: sepals not spreading **pallidiflora**
Pedicels $\frac{1}{8}$-$\frac{1}{6}$ in. long; sepals spreading **corifolia**
(96) Leaves in opposite pairs **lutea***
Leaves mostly in whorls of 3 **97**
(97) Anthers protruding partly or wholly beyond corolla **98**
Anthers not protruding beyond corolla **101**
(98) Leaves with long petioles pressed to the stem **petiolaris***
Leaves without long petioles **99**
(99) Corolla $\frac{1}{8}$ in. long **sexfaria**
Corolla $\frac{1}{12}$-$\frac{1}{10}$ in. long **100**
(100) Stigma 4-toothed **lasciva**
Stigma knob-shaped **imbricata***
(101) Anthers without appendages **genistaefolia**
Anthers with appendages **102**
(102) Corolla $\frac{1}{4}$ in. or more long **103**
Corolla less than $\frac{1}{4}$ in. long **105**

(103) Style protruding from corolla; dwarf plant with spreading leaves — sociorum
Style not protruding from corolla; erect plant with more or less erect leaves — 104
(104) Inflorescence somewhat raceme-like — albens
Flowers in terminal clusters — corifolia
(105) Stigma protruding beyond corolla — 106
Stigma not protruding — 109
(106) Leaves ¼ in. long or more: dwarf brittle plant with widely spreading leaves — depressa*
Leaves less than ¼ in. long, more or less erect; plant erect — 107
(107) Stigma peltate: flowers at the ends of erect shoots — diosmaefolia*
Stigma simple or knob-shaped; flowers clustered on short branches — 108
(108) Corolla segments reflexed when mature, shorter than the tube: sepals shorter than corolla — calycina*
Corolla segments spreading but not reflexed, longer than the tube: sepals as long as corolla — nivea
(109) Sepals spreading — corifolia
Sepals not spreading — 110
(110) Tall shrub; leaves more than ¼ in. long; flowers very constantly in groups of 3 — triflora*
Smaller shrub; leaves less than ¼ in. long; flowers in groups of 3 but clustered — paliiflora

* In the above key the asterisks indicate the species and varieties of Erica which (except for *E. conica*) have been recorded by myself as occurring within the Kirstenbosch boundaries, including the Upper Kirstenbosch Nature Reserve. It may be expected that other species will turn up in this area — for instance *E. chlamydiflora*, *E. glutinosa*, *E. oxycoccifolia*, and some others.

The following are brief notes on the 36 Kirstenbosch Ericas and on the three species of minor genera so far recorded within the area. The numbers prefixed to the species are those that they bear in the Flora Capensis.

Notes on the Wild Ericaceae of Kirstenbosch.

1. *E. Petiveri.* Locally plentiful, especially in dry spots above 2,000 ft.: e.g. at top of Skeleton Buttress and of Nursery Gorge. A specially good scarlet variety is the usual one, and this sometimes grows socially, making a fine display.

5. *E. Plukenetii.* Abundant on the lower slopes of red soil in dry, open situations, e.g. in Protea Garden and by Contour Path Approach. Corolla red, anthers dark brown.

12. *E. mammosa.* The Kirstenbosch variety has the slightly curved translucent corollas of a vermilion colour. Near Klaassenbosch end of Contour Path.

15. *E. gilva.* High altitudes only, e.g. at the top of Fernwood peak. This beautiful long-tubed heath is confined to the Table Mountain group. The corolla is a translucent white with a green mouth.

22. *E. purpurea.* At least four colour varieties can be found among the plants growing in the Silver Tree woodland.

23. *E. coccinea.* Very abundant in dry places on the Upper and Lower Plateaux of Table Mountain. Occasional plants are found at low levels, e.g. on the Aloe Kopje and in the Protea Garden.

24. *E. conica.* Recorded from Kirstenbosch, but certainly rare here. Locally plentiful south of Constantia Nek, but confined to the Cape Peninsula.

45. *E. curviflora.* Occurs only in vlei ground. Abundant in the Swamp Garden and other boggy spots. Reaches 6 ft. high, and well-marked by its long hairy curved corollas in soft colours.

77. *E. cerinthoides.* This is the heath popularly known as "Erica". Its clusters of long hairy red flowers are very distinctive. Occasional on open slopes, e.g. in Protea Garden.

144. *E. pusilla.* Soft straggling shrubs with minute mauve flowers. Moist ground, Klaassenbosch, below road to Constantia Nek.

146. *E. catervaeflora.* A very beautiful and rare plant, which becomes a small tree covered with dense clusters of rosy flowers. The var. *glabrata*, with glabrous corollas, has recently been found at the top of Junction Peak in the Reserve — its only known locality in the Peninsula.

147. *E. parviflora.* Occasional in bushy places at low altitudes, e.g. near gum-belt at Nursery Stream.

156. *E. hirtiflora.* One of our most abundant heaths at low altitude, often growing socially and colouring the dry mountain slopes when in flower.

157. *E. mollis.* Grows in dense masses in some of the reedy swamps near the top of the Mountain. On Fernwood Peak, 3,000 ft.

170. *E. pubescens.* Occasional in bushy places, e.g. on Silver Tree Ridge, near the Aloe Hill Beacon, etc. From *E. hirtiflora*, with which it is sometimes confused, it can be distinguished by its paler flowers and leaves in threes, and by its flowering period being much later (January to March).

174. *E. marifolia.* On shady rocks at higher altitudes, e.g. at top of Nursery Gorge. Roots in rock crevices, the shoots often pressed flat against the rocks: a small plant with white flowers and flat oval leaves.

192. *E. thymifolia.* A little sprawling sub-shrub with delicate branchlets and innumerable purple flowers with exserted black anthers. Abundant in Protea Garden and in some other localities.

197. *E. strigosa.* Occasional on moist, shady rocks, e.g. in Nursery Gorge, from Contour Path to the top.

218. *E. nudiflora.* Very abundant on the dry lower slopes, especially on red soil, e.g. in the Protea Garden.

243. *E. viridipurpurea.* Very abundant on Silver Tree Ridge, etc., especially in the open. The flowers are small, but are produced in enormous numbers, so that the plant is very conspicuous.

258. *E. curvirostris.* At high altitudes, apparently rare. Occurs in small quantity on rocks in Ash Valley at 2,300 ft.

269. *E. ramentacea.* Klaassenbosch, below Constantia Nek Road. Very pretty with bright purple flowers on long slender pedicels clustered at the ends of the branches.

282. *E. physodes.* Very distinctive on account of its greenish-white and very sticky corollas. Occurs at top of Fernwood Peak, 3,000 ft.

293. *E. empetrifolia.* Well marked by its dense spike-like inflorescence of purple flowers. Top of Fernwood Peak, 3,000 ft.

315. *E. hispidula.* Very abundant in open situations. In sheltered situations (e.g. in Nursery Gorge and on the Fernwood Boundary below 1,500 ft.) the variety *serpyllifolia* is very common: this differs only by having oval open-backed leaves.

369. *E. imbricata.* Dry slopes, occasional.

376. *E. diosmaefolia.* Rare at high altitudes, e.g. among rocks in Ash Valley, 2,300 ft., and at Maclear's Beacon, 3,500 ft. An attractive dark green bush, but not very floriferous.

381. *E. lutea.* Frequent above 2,000 ft. Easily known by its slender growth, closely appressed leaves in opposite pairs, and profuse yellowish-white flowers.

401. *E. Halicacaba.* A very striking species with large greenish-white inflated flowers. Always in rock crevices, forming an irregularly branched dwarf bush. Rare, and only seen on Castle Rock at 2,500 ft., though it occurs also just over our southern boundary.

415. *E. baccans.* Robust bushes covered with rosy flowers in early summer, frequent on Aloe Kopje and Protea Garden and elsewhere.

420. *E. triflora.* One of the most beautiful heaths, of very robust growth, and loaded with little clusters of pure white flowers, three in each. Formerly occurred on the Contour Path between Skeleton and Window Gorges, but not seen since the fire of a few years ago.

421. *E. depressa.* A curious little plant with curved branches, flat leaves and scanty white flowers. Always in very moist and sheltered rock cavities at high altitudes, e.g. on Fernwood Peak.

422. *E. petiolaris.* Well-characterised by its rather long petioles appressed to the stem. Flowers white. Usually as a small irregular plant of shady moist or dripping rocks, e.g. in Nursery Gorge, from 1,200 ft. to the top.

426. *E. brevifolia.* Occurs in Nursery Gorge at 1,500 ft., but not noticed elsewhere. The flowers are pink and sticky.

445. *E. calycina.* On the upper slopes, e.g. at the top of Nursery Gorge. Flowers white, the petals being bent backwards at maturity, but straightening out later.

455. *E. cristaeflora.* A scarce species occurring on wet rocks in Nursery Gorge at 1,200 ft. The Kirstenbosch plants come under the var. *blanda.*

12. *Blaeria ericoides.* A very heath-like plant, but readily distinguished by the four stamens. The plant grows into a dense broadly rounded bush, bearing in February myriads of clusters of mauve flowers which fade to a rich brown. Large bushes occur on the Aloe Kopje and in the Protea Garden.

7. *Simocheilus glabellus.* A pretty low-growing shrub with clusters of bright purple flowers, each with four stamens. Occurs on the top of Fernwood Peak and flowers during winter and early spring.

14. *Scyphogyne trimera.* A shrub reaching about 4 ft. with innumerable fine soft plumose branches of a light green colour. The flowers are among the smallest in the whole plant kingdom, and though borne in great numbers make no show whatever. There used to be a fine plant at the top of Nursery Gorge, but this was burnt in the big fire of 1922, and has not reappeared. Another plant has, however, recently been noticed in the same gorge at about 1,200 ft. altitude.

R. H. COMPTON.

Kirstenbosch.
June, 1925.

New or Noteworthy Flowering Plants at Kirstenbosch.

IN selecting a few plants of outstanding merit for notice, the special characteristics of what may be termed "good garden plants or flowers" have been kept in view: that is, ease of cultivation and propagation, neat habit, free and prolonged flowering, and last, but not least of the desirabilities in plants for Cape Gardens, earliness of flowering. There has been a dearth of showy plants up to September. The Cape summer is ushered in with exotic Violets and Daffodils in August. Incomparable as the Daffodils are in form, and all-appealing in their soft colouring, they still lack the glorious wealth of dainty colouring obtainable in the Zand-Veld "Bok Baai Vijges," Vijges in general, Nemesias, Ursinias, Dimorphothecas, Arctotis, etc., of the Winter Rain Belt. During August and September of last year, owing to the increase in stock of these particular plants, visitors to Kirstenbosch were able to grasp their immense value for garden ornamentation and landscape colouring. The range of rich, warm colouring of the Bok Baai Vijges was a revelation rivalling the noted strains of highly developed "Florist's Flowers" in their variety of colour. Preceding the latter in flowering, the annual Vijges make a garden gay in July and August. They do not displace or oust the favourites of long standing, and with the others I propose to note, they fill a gap or add a note in colour to the wealth of material already known, or start or prolong the season of flowers.

Mesembrianthemum criniflorum

The Bok Baai Vijge, is one of the few annual species of this genus. Its natural distribution extends from the Cape Flats, through Darling, Saldanha and along the South West coast, and is mainly confined to the sandy areas. Each district or soil appears to have its colour variety. Colour ranges from silver whites and biscuit colours to purple-pinks and salmon-pink and reds in many arrangements of their combination. Under cultivation it thrives in any rich, sandy soil, red or white, and responds freely to two or three dressings of Bone and Superphosphate during the growing season. It germinates on the advent of rain and should therefore be sown in April, and transplanted as soon as large enough to its flowering place. Its flowering period extends from mid-July to mid-October. It is invaluable as a carpet or an edging and delights in full sun. Its growth is flat and the leaves are flat and somewhat glistening with papiliae. It does not appear to have been used to any extent in European gardens, although introduced there as long ago as 1774. A close species under the name of *Mesembrianthemum tricolor* is used as a half-hardy annual, apparently only in its purple form which gives no idea of the glorious colouring now available.

Ursinia cakilefolia

Another annual of excellent merit is *Ursinia cakilefolia*. It is a rich orange, perfectly distinct from any cultivated garden flowering annual. It commences to flower in July, and continues increasing up to November and even December. Its finely cut foliage, neat habit, free flowering and glorious colour make it the finest spring-flowering annual Daisy extant. Its cultural requirements are similar to *Mesembrianthemum criniflorum*, but should be allowed ten inches each way when planted out. Its height is nine to twelve inches. Its natural distribution must be very local in the North-West Cape or South-West Africa, as it has reached the Gardens only from cultivation (local) and is not under general cultivation in other countries.

Ursinia anthemoides

The *Ursinia anthemoides* is similar in habit and flowering and in its cultural requirements. Its colour range is in light oranges, yellows, and chartreuse greens, with or without maroon or chocolate rings and various iridescent shadings. Its period of flowering is from August to November — somewhat later in starting and earlier to finish than *U. cakilefolia*. As an annual it is of the first rank, and in number and colour variations ranks with many of the strains of the favourite Florists' Flowers. Its distribution follows closely that of the Bok Baai Vijge, but is often met with in fairly open bush, whereas the Vijge favours open places. It was also introduced to Europe in the same year, but does not appear to have made progress in general cultivation, probably on account of an inferior variety being introduced.

Dimorphotheca aurantiaca

Another genus of Daisies of free and showy flowering is Dimorphotheca. The lovely strain of *D. aurantiaca* is too well known and widely grown to need description. It is, however, not entitled to the name it bears, as that name belongs to a shrubby species, whereas the strain under cultivation is a true annual. Both are under cultivation at Kirstenbosch and as living plants are quite distinct.

Dimorphotheca pluvialis

The annual *Dimorphotheca pluvialis* will be known to many from the lovely "Snow Drifts" it makes in paddocks of Groot Schuur. Its two best forms or varieties are from the Saldanha Bay District. One, a giant flower shaded orange in the white. The other with peacock blue or purple at the base of the white ray florets forming a neat, broad ring round the disc. It secured an Award of Merit last year from the Royal Horticultural Society from plants raised from seed supplied by Kirstenbosch for display on the South African Exhibit at Wembley. It requires an abundance of water, but otherwise its cultural requirements are similar to all the above. Its forms vary somewhat in habit, some being erect but most of a wide spreading or decumbent habit, the stronger requiring a spacing of one foot each way.

Diascia Barberae

To turn to a quite distinct genus of showy flowering plants requiring quite different conditions from the above, we find the Diascias represented here by three species which show up prominently. Taking the oldest first, *D. Barberae* was introduced into Europe in 1871 and is still met with under cultivation. It is a dwarf perennial of good bedding habit, with a prolonged season of flowering, but as the "C.P.R." beetle is very partial to its flowers it is not always at its best. Its dominant colour is rose-pink or old rose, and is allied to the Nemesias from which it is readily distinguished by the two spurs instead of one. Propagation may be effected by seeds and division of the roots in September. It quickly comes into flower after planting out and continues free throughout the summer. It is fairly widely distributed in the north of the Cape Province, Orange Free State and Basutoland.

Diascia Aliciae

Diascia Aliciae is not suitable for general garden work as it demands an abundance of shade and moisture. In a shady nook by a streamside it is an object of beauty, and equally so in a shady corner of the stoep, given good soil and liberal watering. The Flora Capensis describes it as an "annual herb". Here it is perennial, and can be propagated readily from the young basal shoots whenever procurable. It should make a good hanging basket plant as its growth is spreading and somewhat pendulous, and the flowers are freely produced throughout summer. It is native of the Kentani District of the Transkei, which is the only locality so far known.

Diascia rigescens

Diascia rigescens is the third species, and is without doubt one of the finest garden plants in existence. It is an herbaceous perennial, but is not deciduous. A well established plant will produce several crops of flowers during the summer. Each shoot is erect and is produced freely from the base; it terminates in a raceme of flowers about a foot long, and near the base of the raceme flowering branches are freely produced. It grows up to three feet high with flowers a deep pink in the bud, becoming a soft pink as they open. It is readily increased by cuttings of the basal shoots as they appear. It requires a good porous soil and moisture throughout the summer. It is widely distributed in the Eastern Province, Orange Free State, Tembuland, Pondoland, etc., and is somewhat varied.

Sutera grandiflora

A near relation of the Diascias is *Sutera grandiflora*, which is, however, very distinct from them. It is a soft-wooded shrub growing to 4 and 5 feet high, each shoot terminating in an elongating raceme of many flowers of a lovely light lavender blue. In garden effect it may be best described as resembling a lavender Perennial Phlox. Its flowering period extends from December well into the winter, when wind and rain considerably mar its beauty. It will be seen at its best as "dot" plants, where each obtains plenty of light all round. Being somewhat loose and straggly in growth it should be cut back about September, and when the strongest shoots are about nine inches long the tips should be "pinched" off to make them bushy. Young plants should be pinched two or three times to secure a well balanced dwarf plant. Cuttings of the soft side growths two inches long root readily under shade or in a frame, during moist, warm weather. It is a native of the Transvaal (Lydenburg, Barberton) and across to Lourenço Marques.

Pycnostachys remotifolia

Passing to the Sage Family, with its many shrubs with their purples and blues, we find in *Pycnostachys remotifolia* one of the finest blues imaginable, bright, vivid Gentian Blue, a Blue of Blues! an outstanding blue in a Family dominant in blues. It comes from Rhodesia and East Africa which no doubt accounts for its late flowering here. Its flowering season is late May and June, and in effect the flowers are produced as large panicles on the upper parts of the branches. A soft-wooded shrub, it renews itself by abundance of new shoots from near the root-stock and base of the branches. These growths, when two or three inches long, root readily under the same conditions as the Sutera, and if somewhat protected up to October, so as to secure an early growth, no doubt the period of flowering would be correspondingly advanced and so miss the cold, wet weather. Its height is from three to four feet, and when massed naturally or in large beds, the colour effect is most pronounced. As young plants the main shoot should be pinched once only. As old plants, the shoots should be cut back to the young growth, which

should be thinned to five to ten of the strongest shoots according to intervening space.

Watsonia Galpinii

Among the bulbs which Kirstenbosch is bringing to light *Watsonia Galpinii* stands out brilliant in its vivid orange-scarlet flowers borne on long graceful spikes in elegant arrangement. Alike for garden ornamentation or indoor decoration it is great and telling. At the water's edge it is a double-decker, the reflection being as bright as the flowers themselves. Flowering during February, March and April enhances its value in all ways. It is the last, but for *W. Pillansii*, to flower of a lengthy series of Watsonias, stretching from August to June, which makes this genus of paramount importance in gardens of temperate climes. The species was described and named by Mrs. Bolus from living plants supplied by the gardens. These were received from the district of Knysna in 1918 and flowered sparingly in 1919 and freely in 1920. It is also known from the Zitzikama and Humansdorp.

It is one of the evergreen species, that is, under normal conditions it has not a decided period of rest. This physical character appears in practically all species peculiar to a summer rainfall, even though the area may be subject also to winter rains — as along the south and south-east coastal regions. This same character is also found in the summer-flowering species of the Western Province, but in a less pronounced degree, as in *Watsonia tabularis*, the vivid orange scarlet species of Table Mountain that has been masquerading under the name of *W. Meriana* for so long. This rather singular but not by any means isolated characteristic in South African bulbs implies an all-the-year-round sufficiency of moisture for successful cultivation, and is perhaps the main reason why this class of Watsonias has failed to gain a hold in the gardens of other countries where so many of our indigens provide colour, grace, perfume and singularity. The species is very impatient of disturbance, and should not be transplanted oftener than every three or four years, but when necessary to replant the clumps should be divided and replanted immediately, otherwise a season's flowers are lost. Transplanting should be done in May, and an ideal position is in good porous soil along a stream-side. Failing such, water must be copiously supplied throughout the summer. Seeds are produced fairly freely, and germinate freely in warm weather, but the seedlings must be kept going "all out" if they are to reach the flowering stage quickly.

J. W. MATHEWS.

Kirstenbosch,
May, 1925.

The Native Vegetation of Kirstenbosch.

AT the present time Kirstenbosch is not only the National Botanic Garden of the Union of South Africa and as such a repository for the growth and study of the flora of the whole Union, but further it includes a not inconsiderable stretch of natural vegetation in the Upper Kirstenbosch Nature Reserve.

The value of such a reserve, both scientific and otherwise, cannot be too much or too often emphasised. Such a reserve can be regarded as a permanent museum and laboratory for the study of the native flora in all its aspects. Only one of these aspects can be treated at present and in the scope of this article that can scarcely be more than glanced at.

In any study of plants or plant distribution it has to be kept in mind that a plant is a living organism, just as is an animal, and can only carry on its life where conditions occur that provide what is essential for it. This distribution is not a mere matter of chance but shows that where a plant is found there it has a favourable locality.

In the present limited condition of our knowledge of plant life it would be an almost hopeless task to unravel the conditions underlying the distribution of all the individual plants. Plants are, however, essentially social organisms and live in groups or communities composed not only of many individuals but generally of individuals of many different species. These communities have a definite unity in that they occur with the same population and appearance in places where the same conditions are found.

Many of these communities are well known and generally recognised: for example, forests, silver tree groves, reed beds round vleis and so on.

At present it is intended only to treat of those communities that occur on the lower slopes of the mountain, that is the slopes below the main mass of the sandstone that forms the steep upper part of Table Mountain. Further, no detailed descriptions of the various communities will be attempted. An attempt will be made rather to outline a scheme of the relationships of those that occur here to one another and to their surroundings. It is hoped that this may give an added interest to nature lovers and

may also suggest points of attack to those who desire a closer acquaintance with what must be regarded by all as one of the most interesting floras in the world.

The lower slopes, especially on the eastern side as at Kirstenbosch, have generally a rather luxuriant vegetation, both as regards the number of species and in their size and in the density of the plant cover. Communities of large bushes or even trees are frequent. Among these are the famous Silver Tree (*Leucadendron argenteum*) of which perhaps the most extensive stretch is at Kirstenbosch, though other examples occur on the Lion's Head and on the Devil's Peak and elsewhere. The silver trees form an open wood: the trees stand apart from one another and their branches rarely meet to form a continuous canopy. Trees of varied size and age occur together: often all ages from seedlings to ancient trees can be found in a quite small area. Where these woods have not been interfered with a number of large bushes occur beneath the trees among which *Protea lepidocarpodendron* (black Protea), *P. incompta*, Rhus spp. and others are common. Below and between these are numerous undershrubs, of which it will be sufficient to mention *Osteospermum moniliferum* (boeta bessie), *Metalasia muricata*, and *Lobostemon fruticosus*.

At the present time Silver Tree woods are very limited in extent and those that do exist have nearly all been more or less modified by cutting, grazing or ground fires. The results of these factors are mainly expressed by a change in the undergrowth which is found to consist of small herbaceous plants instead of the mixed assemblage of shrubs and undershrubs that would otherwise be present.

Silver Tree Woods occur in a considerable variety of situations both on the exposed and sheltered slopes and the present distribution leads to the view that in the past they were much more extensive. The small existing woods look like the survivors from destruction by felling, burning, etc., of a more extensive forest.

These woods occur where there is a fair depth of soil and especially on soils derived from the softer rocks, granite or Malmesbury slate, and to a less extent on sandstone soils.

Another community on these slopes must be mentioned which though not quite a wood is composed of large bushes of 4-15 feet in height among which Proteas are especially prominent. These Bush communities can be found of varying density and height, in all sorts of positions and slopes up to at least 2,700 feet. In this community *Protea lepidocarpodendron* is perhaps the most abundant, but it is frequently associated with others, e.g., *P. mellifera* (sugar bush) and *P. incompta*. The last may replace the first-named altogether as at Kirstenbosch. *P. grandiflora* (waaboom) is another species that occurs in this community, especially at the higher levels: this is a drought-resistant species and is especially abundant on dry and shallow soils.

These Protea bushes may form almost pure communities but more frequently are associated with many other plants among the most abundant of which are Leucadendron (shrubby species), *Leucospermum conocarpum* (kreupelhout), several species of *Erica* and *Aspalathus*, etc., etc. The soils occupied by these Protea Bush communities are more sandy than those of the Silver Tree Wood and often shallower. They are characterised by the presence of dark humus in the surface layers.

While these two communities are the most complex, that is, are composed of the largest plants and of plants occupying different layers or strata so that the smaller are protected by and dependent on the larger, they are far from covering the whole of the lower slopes. Even those parts where the environmental conditions seem most suitable often bear quite other communities. Much of the ground is occupied by communities of much smaller plants, undershrubs and reeds. Among such plants it is only necessary to mention a very few: *Pelargonium cucullatum*, species of Erica, Aspalathus and Lobostemon, *Montinia acris* (pepper-bush), many Restionaceae, and Watsonia spp. and many other "bulbous" plants.

These undershrub and reed communities are much more varied in their composition than the former ones and often exhibit changes in quite small areas. It is impossible with the present limits of space to attempt to enumerate even the general features of all these communities. They show great diversity both in density and in the form of the plants composing them: in some the plants are widely spaced and do not apparently affect one another, while in others the plants form a rather dense thicket.

At first sight it may appear impossible to correlate these various communities with measurable changes in the surroundings, but when once the principle of what is termed "succession" has been grasped some clear order can be obtained.

A plant community, such as those mentioned, has both a definite composition and occurs under definite measurable conditions of environment, and further, has a definite history and development, which may have extended over very long periods of time. For example, we are not to think that Silver Tree Woods have occupied the sites that they do ever since the sites themselves were formed. They are, rather, the vegetation that can flourish and reproduce itself under the existing conditions of climate, soil, etc., and appear there as the result of the effects of the previous communities that at one time grew there.

In the case of a land surface, at some time there must have been bare soil which has become populated by plants.

The first plants to appear would, of necessity, be plants that made few demands beyond anchorage on the habitats. Gradually, in course of time, the habitat becomes more and more modified, soil is formed and broken up by plants, rain, wind, etc., humus is accumulated and so on. As a result the conditions become changed so that a fresh community of plants finds its suitable conditions and drives out the pre-existing one. The time taken between the different stages and the number of these stages vary enormously, but in all cases are controlled by the climate.

In all cases the succession leads from simpler to more complex communities, from those that make little demand and have little control to those that control the conditions more and more completely. The final stage that is reached in any succession in any given climate is termed the *climax*. A climax community differs from those forming the earlier stages in that it is stable and reproduces itself while the others show a gradual change till the climax is reached. Of course, if the climate alters the end-phase of the succession alters and a new community becomes the climax. But when the climatic conditions remain unaltered, in the absence of interfering factors, all the vegetation will gradually approach towards the climax, and if this is destroyed it will be reproduced either directly or after a series of developmental stages is passed through. Such a succession that commences when a climax is destroyed has been termed a secondary succession to distinguish it from the primary succession which is that starting from bare soil.

It is, of course, only in a very few cases that we are able to trace out and follow the primary succession. In a few cases it can be done as for example in volcanic regions, in the case of bare sand and so on. Ordinarily we can at most see the end stages and often not even these. Secondary successions, however, can often be traced out in detail. The climax is destroyed, from some cause or other, and regrowth takes place which culminates in its reformation.

In any region, except those with very uniform topography and other conditions, no matter how little man has interfered, the whole will not be found covered with climax communities. Various local factors such as extreme steepness of slope, instability of soil, rivers with eroding banks and so on, prevent the establishment of the climax or cause its destruction if established.

Now let us apply these principles to the area under consideration and see whether some clear arrangement cannot be made out for the various communities.

First then, there seem to be two which must be regarded as climax communities: the Silver Tree Wood on the deeper finer-grained soils and the Protea Bush on the shallower soils. In the latter, especially, we can trace quite a number of stages in the secondary successions. The mature Protea community is frequently destroyed by fire, by cutting or some other means. After a fire the ground becomes covered by herbaceous plants, e.g., *Watsonia rosea*, *Bobartia spathacea* (biesroei), *Montinia acris*, various plants belonging to Cyperaceae, together with many small plants which are either annuals or perennials with some sort of underground storage organ. Indeed, many of the most prized flowers of the Peninsula flourish best in this early regrowth after fire.

After a time, the length of which depends on local conditions of soil, exposure, altitude, etc., other plants begin to assert themselves, prominent among which are Restionaceae, *Pelargonium cucullatum*, *Hermas villosa* and many others. The growth of shrubs too becomes gradually more and more dense till gradually the climax is re-established.

Under the present condition of very frequent fires any of the regrowth stages may be burnt and again produce an area for commencement of regrowth. Also the amount and intensity of destruction varies very greatly: it may be very great or only partial. Bushes of *Protea grandiflora* or *Leucospermum conocarpum* for example, often survive a ground fire that destroys other bushes and then are found scattered through a community of small plants.

Some plants, again, recover after fire much more quickly than others when the aerial parts are killed. A marked example of this behaviour is found in *Bobartia spathacea*. This plant when present in any quantity is a sure indicator of a previous fire: other plants that can be taken as indicators in the same way are *Erica cerinthoides*, *Pelargonium myrrhifolium*, etc., and at higher altitudes *Alciope tabularis* and *Tetraria thermalis* (berg palmiet). Many others could be mentioned.

In this sort of way, we can see in practically all the communities of undershrubs or herbaceous plants on the lower slopes stages in the regrowth of the climax after one or more years. The more severe or the more frequent the fires are the longer will be the interval of time before the climax becomes re-established. Other factors causing a destruction of the climax produce corresponding results, that is simpler communities appear and show a gradual change which leads to the reformation of the climax.

The length of time before such re-establishment is achieved will depend on the amount of alteration in the conditions that is brought about and on the complexity of the climax. Other factors will, of course, operate as well; for example, if only a small part of a climax community is destroyed regeneration will generally be more rapid owing to the contiguity of the plants for reproduction.

In the space available it is not possible to give any details

of these secondary successions, but it is hoped that enough has been said to show that they do exist and can be traced in the field by those interested.

While the Silver Tree Woods and the Protea Bush represent the climax communities of two lines of succession, they are not the only ones in this area. In the ravines and on the very sheltered slopes we have another quite distinct community, the Forest.

This is composed of trees belonging to a considerable number of species, some rising to a moderate height and nearly all characterised by the possession of elliptical evergreen leaves of a dark colour and frequently with a polished surface. Such leaves are found, for example, in Olea (ironwood), Olinia (hard pear), Cunonia (red els), and Podocarpus (yellowwood). Larger leaves of thinner texture occur in Ocotea (stinkwood) and Curtisia (assegaiwood).

Unlike the communities considered before, in these forests the trees stand close together and their branches interweave forming a closed rather dense canopy that very much reduces the amount of light that can penetrate to the ground. The amount of evaporation is also very much reduced. These factors result in a completely different set of associated plants. Instead of the small-leaved undershrubs and reeds, the ground in these forests is occupied by ferns, grasslike plants and herbs with broad and thin leaves. In addition there are a number of climbing plants, some of which have woody stems which form the so-called " monkey ropes ": also not infrequently plants are found growing on the stems or branches of the trees.

The forests as they exist at Kirstenbosch and on other parts of Table Mountain have nearly all been greatly altered by the activities of woodcutters, etc. Most of the larger trees have been cut out and many of the existing ones are in the form of coppice,—that is, they have many stems arising from the stump. This elimination of the larger trees and the resulting dense growth of small ones and of coppice shoots has, in parts, resulted in the production of a very dense canopy and a reduction in the number of plants in the undergrowth.

The forests contain very few species indeed which are found in the communities of the open hillside. They clearly form a quite distinct plant association, both in population and in the general form of the plants. It is one which owes its existence here to the moister conditions that occur in the ravines and very sheltered slopes where there is little direct drying from the sun. It is to such places that the forests are confined.

At the present time the forests that exist are remnants of a very much more extensive community. Fire, woodcutting and other factors have caused their destruction and disappearance in many parts.

Now we saw that in the case of the Protea Bush destruction of the climax was followed by a gradual regeneration that took a varying length of time. But in the case of the Forest the areas which have been destroyed have become occupied by communities of the series that would culminate in the Protea Bush. That is to say the destruction of one climax apparently has been followed by a secondary succession that culminates in another. But we defined a climax community as being the highest and stable point reached in the development of the vegetation under the given conditions of climate, etc. The Forest with its closed canopy and consequent great control of the habitat undoubtedly represents a higher stage of development than the Protea Bush, so that it becomes essential to find some explanation for the apparent replacement of the one by the other when a destructive factor becomes operative.

Some succession stages can be traced in the Forest but these are confined to a zone marginal to and immediately adjacent to the Forest itself. Such plants as *Cluytia pulchella*, *Podalyria calyptrata* (keurtje), *Polygala myrtifolia* (langeleden) and others are prominent here, together with *Virgilia capensis* (keurboom) on the lower reaches.

Most of the area exposed when Forest is destroyed, however, becomes populated by plants much more characteristic of the other series of communities though growth in these damper parts is generally luxuriant.

DESCRIPTION OF PLATE II.

Fig. 1. General view of the lower mountain slopes at Kirstenbosch. *Protea* Bush in foreground. The shorter growth higher up the slope is the effect of fire. The distant slopes in shadow are covered by trees, chiefly planted Pine and Oak.

Fig. 2. *Protea* Bush at Kirstenbosch. *Protea incompta* with *Rhus tomentosa*. Below are *Pteridium aquilinum*, *Aristea capitata* and others.

Fig. 3. Forest by stream in a ravine. The trees are *Gymnosporia acuminata* with *Halleria lucida* and *Curtisia Faginea*. The ground is densely shaded and bare except for mosses. Nursery Gorge by Contour Path, Kirstenbosch.

Fig. 4. *Protea* Bush after a fire. *Protea grandiflora* scattered small bushes with many dead branches. Other plants are *Rhus lucida* and many grass-like plants such as *Tetraria ustulata*, *Ficinia* sp., *Danthonia macrantha*, etc. Above Contour Path, Kirstenbosch.

Fig. 1.

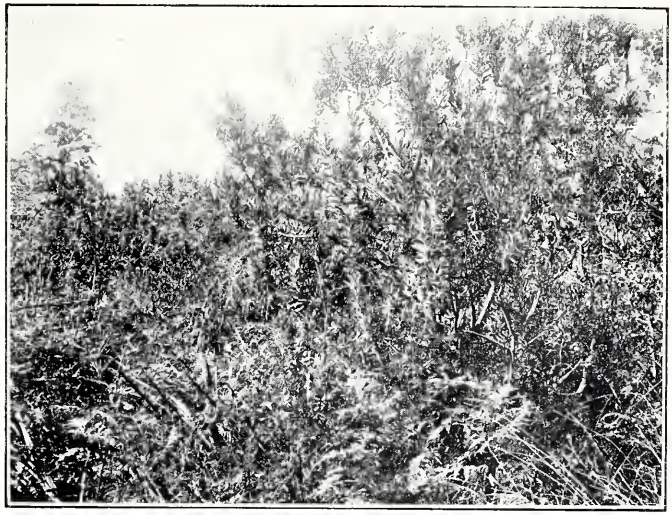


Fig. 2.

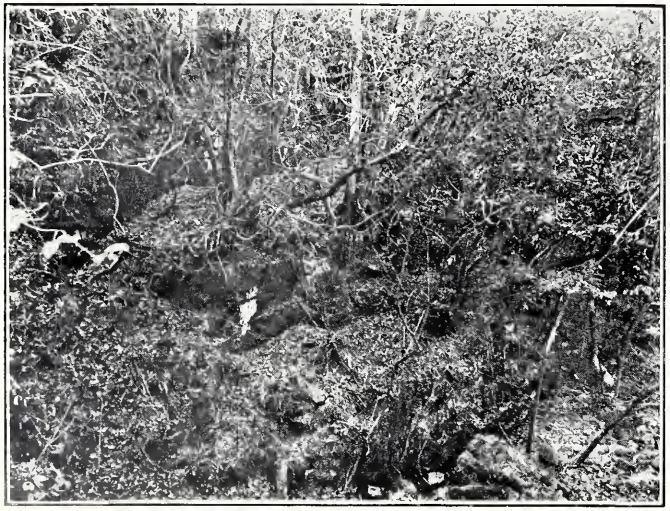


Fig. 3.

Fig. 4.

Plate II. The Native Vegetation of Kirstenbosch

No very satisfactory explanation of this failure of regeneration of the forests has yet been reached. The most that can be put forward is a working hypothesis which must await detailed investigation before it can be looked upon as more definite.

The trees that compose the forest canopy are nearly all of very slow growth and produce rather a small amount of good seed, while the plants of other communities have a much more vigorous growth and reproduction. This, however, is probably not more than a subsidiary factor.

If we look at the distribution of the forests over South Africa we can obtain some much more suggestive facts to go upon. The main area of their distribution occurs in the Knysna district where large tracts of country are covered by continuous forest of this type. Here the climate is distinctly more humid with rainfall distributed through the year. Westward from this region the forests become much more limited and restricted, and in our area with winter rain and dry summers they only exist in places where the atmosphere is always relatively moist.

From their distribution here and the general geographical distribution it would appear that the Forest is the climax community resulting from conditions differing from those of the Protea Bush in having a greater degree of moisture throughout the year.

Again, it is well known that a forest covering a wide area causes an increased general humidity. This might explain how in the past these forests covered much wider areas than they do now. On forest-clad slopes with shelter and traversed by ravines the necessary moisture would be attained. But once destroyed the increased evaporation and oxidation of humus combined with very slow growth which is a marked feature even in the main forests, allow the more vigorous Protea Bush communities to capture the ground except in the deepest ravines.

Most probably the forests on the open slopes always had moisture very little above the minimum required so that any factor operating adversely would turn the scale in favour of the less water-demanding communities.

Whether if burning, grazing, etc., could be wholly stopped the forest could recapture its original area must remain an open question pending detailed experimental work on the subject. That such regeneration might take place is suggested by the marginal fringe around the forests, but the rate of advance would appear to be excessively slow.

At any rate it appears that forests exist under the condition occurring in the moister parts of the mountain slopes, and need not be regarded, as has been done by some, as being relics of climatic conditions that have undergone a change in the direction of increased dryness.

R. S. ADAMSON.

Botanical Department,
University of Cape Town,
December, 1924.

The Harold Pearson Memorial Hostel.

EVER since the old farm Kirstenbosch was chosen to be the National Botanic Gardens of South Africa, the need has been felt for residential accommodation. The homestead itself had long fallen into hopeless ruin, and there was only one small cottage on the estate. This was altered and made into the Curator's house, which is the conspicuous and not altogether beautiful building just within the main gates.

An acorn store was adapted for use as a cottage for the Ranger, and a house was built among the silver trees for the Director. In 1919 six small cottages were completed, with the object of providing accommodation for workmen. They have never been all used for this purpose, but three or four of them have been occupied from the outset as a temporary hostel for women working in the Gardens. So that the problem of residence at Kirstenbosch has been hitherto met by a series of makeshifts, more or less unsatisfactory.

After prolonged efforts, however, it has now become practicable to build a hostel capable of accommodating workers in reasonable comfort. The money necessary for this purpose has come from two sources. At the death of Dr. Pearson, first Director of the Gardens, subscriptions were collected from the public towards providing some permanent memorial to him and to the great work he had done in connection with the establishment of the Gardens.

As the result of discussions which followed the raising of this fund, the project was adopted of building a hostel, to be called the Harold Pearson Memorial Hostel, and to accommodate those who work permanently or temporarily at Kirstenbosch, whether as members of the Gardens staff, apprentices, botanical students, artists, or in other capacities.

The funds collected were, unfortunately, insufficient to provide a building which would be adequate and capable of being run on a satisfactory financial basis, and the assistance of Government was sought and obtained on the £ for £ basis. Owing to the high costs of building, however, it was impossible to obtain a satisfactory contract until last December, when an agreement was signed with Messrs. Thain and Wilson, and the work was put in hand at once.

The site chosen for the building is a magnificent one, and its position is shown on the plan of the Gardens printed in this part of the JOURNAL. It lies immediately to the north of Window Stream on the mountain side of Rhodes Road. When necessary clearing has been done a splendid view will be obtained of Wynberg Hill and the distant Simonsberg and Drakenstein Mountains. Around the building are fine oaks and other trees. The site is well drained and is protected from the full force of the wind. The building will be approached, when the full scheme has been completed, by a branch road from the new Main Entrance Drive into the Gardens (this latter will turn off the Rhodes Road at a point opposite the Claremont hard road, and will lead direct to the Tea House and the Terrace).

The building plans were drawn by Messrs. Walgate & Elsworth, A.A.R.I.B.A., of Cape Town, the well-known architects. The perspective drawing reproduced in Plate III. shows what the building will look like when completed: and the skeleton plans reproduced as text figures show the internal accommodation.

The building is designed in a plain and dignified Dutch style. It is being built of brick, plastered and white-washed, and the roof is thatched with reeds in the traditional manner. There are two storeys. On the ground floor is a large central dining room on one side of which is the sitting room and on the other the Warden's quarters; while behind are the kitchen, pantry, larder, etc., and the servants' room, also a cloak room opening outside under a covered stoep, which will be invaluable as an entrance.

Upstairs there are seven bedrooms of various sizes with two bathrooms, linen-room, box-room and housemaids' closet. The details of the building have been most carefully thought out with a view to maximum convenience, though the limited funds available have compelled the sacrifice of some features.

It is unfortunate that it is not possible to build the stoep at present, but it is hoped that private generosity will supply this important feature. The same lack of funds prevents the installation of a proper water-borne sanitary system — a defect which it is most desirable to remedy. It is not yet certain whether it will be possible to instal electric light, but the building is being tubed in anticipation of this: and it is sincerely to be hoped that in the Hostel, and also in the other buildings on the estate, the expense, danger and misery of oil lamps and candles will be abolished. Until this happens evening work in study, office, laboratory and herbarium, as well as evening classes and private reading and recreation will continue to be handicapped or impossible.

The temporary hostel which was until recently under the control of a special committee (with Lady Rose-Innes in the chair) was used entirely for women. These included any women on the Gardens Staff, and also the apprentices and improvers who were learning gardening methods. The teacher of Nature Study also resided at the Hostel, and accommodation was provided for occasional classes of students and teachers.

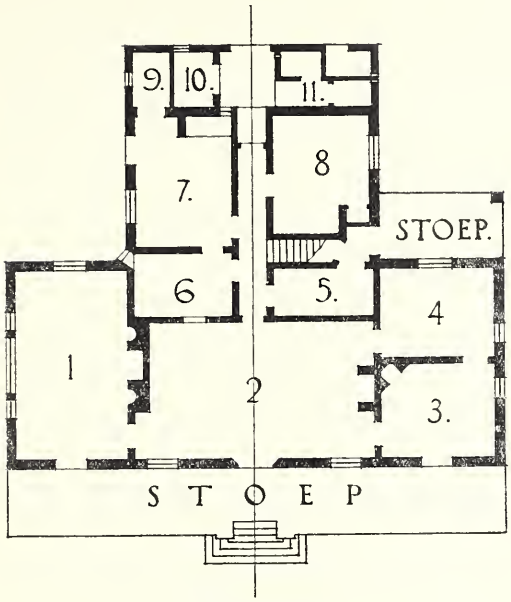
The Gardens authorities did not lose sight of the desirability of accommodating men, though it was impossible to do so under the old conditions. The new building has been so arranged as to permit of both men and women residing there if necessary.

The necessity of this is clear in view of the sanction by the Trustees of the appointment of a botanical assistant who may be of either sex, and the foundation of the Edward Muspratt Solly Scholarship, the holder of which must be a male: as well as in the general interests of the Gardens. As the Gardens grow and the scientific, clerical and gardening staff increases, it may become necessary to provide a second Hostel, but the necessity for this will probably not arise for several years.

The Hostel will in future fall under the control of the Trustees, through the Director, and this will result in a great simplification of the relations between residents and the Gardens authorities. The management of the Hostel will be in the hands of a Lady Warden, and Mrs. Stow, who has acted in this capacity in the temporary Hostel, has accepted this post.

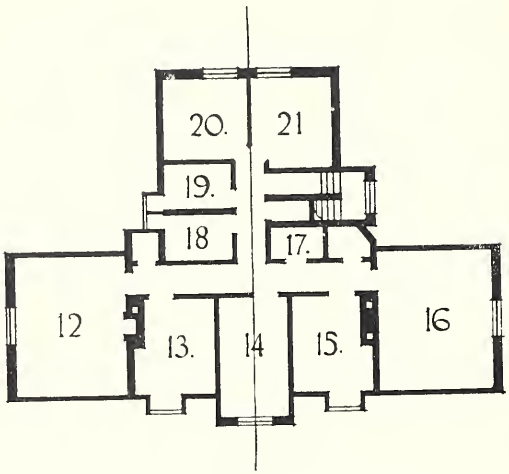
The new building will be a very valuable piece of equipment for the Gardens and will help to solve many problems of staffing, apprenticeship, etc. Moreover it will set free the cottages for other and more suitable uses. It will provide a comfortable home where rest, amusement and study may be enjoyed. And it will perpetuate the name of him whose brain conceived and whose energy brought into being the National Botanic Gardens — Henry Harold Welch Pearson.

Plate III. The Harold Pearson Memorial Hostel.



Ground Floor.

1. Sitting Room.
2. Dining Room.
3. Warden's Sitting Room.
4. Warden's Bedroom.
5. Cloaks.
6. Pantry.
7. Kitchen.
8. Maids' Room.
9. Larder.
10. Store.
11. Lavatory Block.



First Floor.

12. Bedroom.
13. Bedroom.
14. Bedroom.
15. Bedroom.
16. Bedroom.
17. Box Room.
18. Bathroom 1.
19. Bathroom 2.
20. Bedroom.
21. Bedroom.

Some Recent Publications.

J. W. Bews. — Plant Forms and their Evolution in South Africa. pp. 173 and 26, 1 map and 31 figs. (London: Longmans, Green and Co., 1925.)

The problem of the origin of the flora of a country is one which will always have a fascination for the lover of plants. Though a complete solution of the problem is hardly to be expected, the increase of our knowledge in all directions throws new light on the subject; it is in this way that Professor Bews, whose writings on the flora of the Union are well known, comes to this old problem.

For many years now it has been recognised that, in South Africa, we have two distinct floras, the one in the South Western portion, and the other in the Eastern and Central parts. It is with the origins of these two that the present book is concerned.

Professor Bews summons the evidence gained from many aspects of botany, but especially the ecological side to help in the solution of this puzzle.

Africa is a very old and stable continent and all the available evidence goes to show that neither the physical features nor the climate have undergone material change since the time when the flowering plants were first evolved. The land connection with the tropics and the northern hemisphere has remained unbroken and no devastating influence, such as an ice age, has occurred.

The plant covering of any area passes through a series of stages of development from the first colonisation of the land till a stable flora is attained. This series of stages, known as succession, of course, varies immensely in detail according to local conditions, but in a general way it tends to a modification of the conditions of soil, etc., to produce a condition of medium moisture, etc.; that is dry conditions tend to become more favourable and aquatic ones to become drier. Of course, it is evident that the

climate fixes a limit to the extent of this modification of the surroundings or habitat.

In connection with this phenomenon of succession it is claimed that certain types of habitat have remained unchanged for enormous periods of time, for example, the moist tropical forest, marshes and swamps, and to some extent habitats along the coast. In these unchanging habitats it is that plants are looked for which are more primitive and more in the condition in which they were originally evolved. The author analyses the flora and growth form of such habitats and points out that plants regarded from other points of view as relatively primitive here predominate.

The general growth form is that of a tree with a large simple leaf. Evidence is adduced from fossils and from structure to show that the tree form is to be regarded as more primitive than the bush or herb. All other types of growth form, bushes, undershrubs, herbs, bulbs, annuals, etc., are regarded as derivatives from those of the more primitive habitats, and to have been evolved in relation to the colonisation of drier and drier areas.

In the discussion on the flora of the eastern portions and central region of South Africa the author makes out an exceedingly good case for the origin of the existing flora from migrations from "the vast reservoirs of plants in the tropics" which have spread gradually to the more temperate and drier regions. The more extreme the conditions are, the more highly modified have the plants become as compared with the primitive form.

A special chapter is devoted to the very fascinating question of the origin of the grasses. The evolution of the grass type of plant rendered possible the colonisation of vast areas of country by flowering plants. The grasses are regarded as having arisen from either marsh plants or from plants living in the forest margin.

The extreme of modification of plant form is reached in the flora of the very arid regions of the karroo and deserts, which are treated rather shortly and in less detail than the great interest of the floras might seem to demand.

As a corollary of the author's views on the evolution of growth form, it follows that the sequence in succession is the reverse of that in phylogeny. Succession passes from the more highly modified to the more primitive. This view may appear rather startling and unorthodox to many but the arguments brought forward in its favour are certainly ingenious.

While the flora of the eastern and central parts can be looked on as derived from plants that have migrated from the tropics the case is different when we turn to the flora of the South West. This flora is generally regarded as ancient, but in its growth forms most of it is rather highly evolved.

Two views have been held as to its origin, but the author does not definitely commit himself to either of them. It may have had a northern origin and have reached its present position by way of mountain ranges at an earlier period than the main migration from the tropics: or, alternatively, it may be of southern origin and may once have covered a more extensive area from which it has been ousted by the more progressive tropical-subtropical flora.

In support of the former view elements of this flora are found along the higher mountain ranges right into the tropical zone; again, evidence of the advance of the other flora into the south-western area is claimed by the author to be shown by the outliers of karroo succulents that are found here and there.

Those who are familiar with this flora will probably feel a certain disappointment in this part of the book. Indeed it must be said that Professor Bews has added little to our knowledge of the floras of the South West or of the Karroo or deserts and his treatment of these is much less vivid than is that of the eastern parts.

All through the book Professor Bews shows a marked aptitude for picking out the evidence from many sources that supports his main contentions, sometimes even to the extent of minimising contrary views. As a result probably few will feel inclined to accept all his conclusions, but all interested in plant distribution and especially in distribution in South Africa must feel grateful that the matter has been brought into prominence.

The book should serve as an incentive to further work and as a stimulant to interest and discussion on a most attractive aspect of botany.

A fairly full bibliography of works relevant to the subject matter is given, and the book is illustrated by a number of drawings of plants of characteristic growth form which are the work of Miss S. Gower of Pretoria.

R. S. A.

DOROTHEA FAIRBRIDGE—"Gardens of South Africa," with 28 full page illustrations in colour by F. Drake, E. Driscoll and others. pp. viii. & 213. Cape Town, Maskew Miller, 1924.

This book is the first of its kind in South Africa. Its appearance is in fact something of a phenomenon for though we have had gardens at the Cape for the best part of three centuries, no South African seems to have thought them worth describing. Yet callers such as Père Tachard and François Valentyn in 1685 or thereabouts wrote of the Company's Garden in Cape Town as "one of the

loveliest and most curious gardens," "incomparable" and "matchless": and since their time countless visitors have been enraptured by the beauty of our gardens — not so much perhaps by their design or orderliness as by the wealth of decorative material that is in our hands.

In England garden picture books flow regularly from the press: many of them only excused by their illustrations. "Pot-pourri from a Surrey Garden" was able to stand alone on the strength of its text but few of Mrs. Earle's followers have produced books which are worth *reading*. Many of them are mere re-hashes of their predecessors served on a fresh set of plates.

Miss Fairbridge's book is exceptional in this respect, that for the most part one turns over the illustrations more rapidly than the text. She has an entirely new subject to handle, and she does it so well that the illustrations seem superfluous. At the same time one must thank the artists for such excellent work as that of "Hydrangeas on the Stoep, Paradise, Claremont" (E. Drake) and "Red Bougainvillea on a Durban Pergola" (E. Struben) which would adorn any book. The drawings of individual flowers, which do not seem to have been done from nature, would have been better omitted, as they are far from doing justice to the Cape flora.

The book aims at giving a description of South African gardens in our various climates, special attention being naturally given to those of the Cape. There are chapters on garden planning, garden colour, water gardens, drought gardens, hedges and edges, pergolas, garden friends and enemies, and a whole chapter — almost the longest in the book — on roses. All these are written with knowledge and humour, and what is even more important, *con amore*. There are chapters on gardening with our native plants — and no country in the world has better opportunities of doing this than South Africa — as well as charming descriptions of the Tulbagh Wild Flower Show and the western sand-veld in spring. Finally there are chapters of most valuable advice to beginners, lists of desirable plants and a garden calendar.

Altogether we owe Miss Fairbridge deep gratitude for an excellent and delightful book. It is not perhaps intended as a companion to her "Historic Houses of South Africa," but the same spirit is embodied in both: South Africa is a good place to live in, a country of homes.

R. H. C.

The Botanical Society of South Africa.

ANNUAL REPORT, 1924.

The Council has pleasure in submitting the Twelfth Annual Report of the Society.

MEMBERSHIP.—The membership of the Society stands at: Life Members, 62; Family Members, 57; Members, 455; Associates, 313; total, 887, as compared with 783 in 1923.

ANNUAL GATHERING.—The Annual Gathering at Kirstenbosch was held on Saturday, October 18th, and there was a record attendance of members and associates and their friends.

COUNCIL MEETINGS.—Four meetings of the Council have been held during the year.

ANNUAL GENERAL MEETING.—At the Annual General Meeting, held on March 27th, the following officers were elected for the year:—

President: The Right Hon. Sir James Rose-Innes, P.C., K.C.M.G.

Vice-Presidents: Sir Lionel Phillips, Bart., the Hon. Sir Lewis Michell, C.V.O., and Sir Max Michaelis.

Members of the Executive Council: Professor R. S. Adamson; Mr. W. Duncan Baxter; Mrs. L. Bolus; Mrs. Carter, C.B.E.; Mr. F. E. Cartwright; Sir Drummond Chaplin, K.C.M.G.; Professor R. H. Compton; Mr. W. A. Eaton; Miss Fairbridge; Mr. P. Stuart Horne; Lady Rose-Innes, C.B.E.; Mr. H. T. Twentyman Jones; Mr. W. de N. Lucas; Mr. H. C. Starke; Mr. E. J. Steer; Miss E. Struben; Mr. W. Webber, M.L.A.; Miss F. M. White; Mrs. H. S. van Zijl; Major G. B. van Zyl, M.L.A.; Mr. R. J. Kingston Russell, (Mr. E. J. Steer having signified his inability to serve Mr. R. J. Kingston Russell was elected in his stead).

At the first meeting of the Council Sir Drummond Chaplin was elected Chairman for the year; Mr. H. T. Twentyman-Jones, Hon. Treasurer; and Mrs. L. Bolus, Hon. Secretary.

JOURNAL.—The Journal of the Society was published in March and was much appreciated by members. The

Council tenders its appreciation and thanks to Professor Compton, the Editor.

VACATION-COURSES.—Two vacation-courses conducted by Mrs. Bolus and Miss Starke were held—one in June, attended by six students, and one in September, attended by nine students. All who could be accommodated resided at the Hostel.

MONTHLY MEETINGS.—A meeting of members and associates and their friends has been held at Kirstenbosch on the third Saturday of each month in accordance with the programme of activities published in the Journal for 1924. At these meetings members have in turn acted as hostesses and provided tea. The Council desires to express its acknowledgments to these members who thus helped to make the meetings as enjoyable as they were, as well as to Professor Compton and Mr. Mathews for the valuable information they so generously gave. Seeds, seedlings, and cuttings were distributed liberally.

TEA HOUSE.—The Tea House was completed and handed over by the builders to the Trustees in July, and was opened to the public on the first of September. The amount contributed by the Society was £400, the result of private collection.

FINANCIAL.—The audited Financial Statement accompanies this Report, and from this it will be seen that the sum of £402 17s. 4d. has been available for the purpose of augmenting the funds of the National Botanic Gardens, as compared with the sum of £492 6s. 9d. in 1923.

APPEAL FOR NEW MEMBERS.—Although it is gratifying to be able to report a substantial increase in the membership, it is necessary to emphasise that the Gardens are still in urgent need of funds for their development and maintenance. Members are, therefore, earnestly requested to interest their friends in the work carried on in the Gardens and to point out the privileges attached to membership, thereby inducing as many as possible to join the Society.

N.B.—(1) Life Members, £25. (2) Annual Members: Family Members, £2 2s.; Ordinary Members, £1 1s.; Associates, 5s.

The Council has to express its indebtedness and hearty thanks to Mr. R. L. McDonald for auditing the accounts: to the City Council and the South African Association for the use of rooms for meetings; and to the Press for valuable assistance in reporting matters of interest.

DRUMMOND CHAPLIN, *Chairman.*
L. BOLUS, *Hon. Secretary.*

BALANCE SHEET AS AT 31st DECEMBER, 1924.

LIABILITIES.

	£ s. d.	£ s. d.
Life Members' Reserve Fund ..	427 9 6	
Added during year	100 0 0	
	527 9 6	
Less amount donated to Kirstenbosch Tea House	22 9 6	
		505 0 0
Subscriptions paid in Advance ..		47 19 6
Sundry Creditors		9 8 4
Kirstenbosch Tea House:—		
Balance as per last Balance Sheet	255 1 0	
Donations as per Schedule attached	191 16 0	
	446 17 0	
Donated by this Society ..	22 9 6	
	469 6 6	
Amount paid over to Trustees, National Botanic Gardens	469 6 6	
Amount paid over to Trustees, National Botanic Gardens, per contra		100 0 0
National Botanic Gardens:—		
Surplus for year 1924 ..	485 16 6	
Less paid over	250 0 0	
		235 16 6
		£898 4 4

ASSETS.

	£ s. d.	£ s. d.
Fixed Deposit:—		
Cape of Good Hope Savings Bank	319 14 4	
Accrued interest	15 19 8	
		335 14 0
Investment Account:—		
Union of S.A. 5% Loan 1920-39 (cost) ..	200 0 0	
Accrued interest ..	2 18 1	
		202 18 1
National Botanic Gardens:—		
Donation, Divisional Council of the Cape, per contra .		100 0 0
Cash at Bank		259 12 3
		£898 4 4

REVENUE AND EXPENDITURE ACCOUNT FOR 12 MONTHS ENDED 31st DECEMBER, 1924.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Bank Charges .. .	1 7 5		By Subscriptions		576 16 6
Gathering of Members at Kirstenbosch	17 17 7		Ordinary	406 3 0	
General Expenditure	43 19 9		Family	105 0 0	
Stationery, Printing and Advertising	13 12 6		Associate	59 13 6	
Journal Account	34 1 8				
		110 18 11			
Balance — Surplus for year ..		485 16 6	Interest		25 18 11
		£596 15 5			£596 15 5

Schedule showing how the amount of £191 10s. 0d., collected by this Society on behalf of the Fund for the Tea House at Kirstenbosch, is made up.

	£ s. d.	£ s. d.
W. Duncan Baxter	50 0 0	
S. C. G. Levin	50 0 0	
Mrs. Leslie Urquhart	11 15 0	
M. L. Fisher	10 0 0	
Anonymous	10 0 0	
Lord Woolavington	10 0 0	
S.A. Milling Co., Ltd.	10 0 0	
W. G. Spillane	5 5 0	
F. E. Cartwright	5 0 0	
Mrs. M. A. T. Henshilwood	5 0 0	
Sir J. Rose-Innes	5 0 0	
W. J. Spracklen	5 0 0	
R. Stuttaford	5 0 0	
Miss Reynolds	2 12 0	
Mrs. E. Withinshaw	2 2 0	
Wm. Spilhaus	1 1 0	
A. J. Ward & Co.	1 1 0	
Sir Drummond Chaplin	1 0 0	
W. C. v. d. Steer	1 0 0	
Miss G. Hudson	10 0	
A. J. Murray	10 0	
		191 16 0

Audited and found correct.

DRUMMOND CHAPLIN, *Chairman.*
H. T. TWENTYMAN-JONES, *Hon. Treasurer.*

Cape Town,
17th February, 1925.

R. L. McDONALD.
Hon. Auditor.

Programme of Monthly Gatherings at Kirstenbosch.

The following dates have been fixed for the current year: these being the *third Saturdays* in each month.

January 17. Tour of Gardens (Prof. Compton).
February 28. Demonstration of Seed Sowing (Mr. Mathews).
March 21. Demonstration of Taking Cuttings (Mr. Mathews).
April 18. Tour of Gardens (Prof. Compton).
May 16. Demonstration of Pricking Off (Mr. Mathews).
June 20. Demonstration of Pruning (Mr. Mathews).
July 18. Tour of Gardens (Guide to be arranged).
August 15. Demonstration of Grafting and Budding (Mr. Mathews).
September 19. Demonstration of Potting (Mr. Mathews).
October 17. ANNUAL AT HOME.
November 21. Demonstration of Spraying (Mr. Mathews).
December 19. Demonstration of Fertilising (Mr. Mathews).

Each Gathering (except the Annual At Home for which special arrangements will be announced) begins at 3 p.m. and lasts about an hour. Buses leave Newlands Station at 2.30. Tea is obtainable afterwards at the Tea House.

Members are cordially invited to take advantage of the opportunities thus offered them to obtain a better acquaintance with the work at Kirstenbosch, and with our native plants and the methods of cultivating them. The Gatherings are quite informal and there is no charge for admission of Members or of their friends who may accompany them.

List of Members of the Botanical Society.

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary, P.O. Box 127, Cape Town.

ABBOTT, C. W.
Abercorn, Duke of
ACKERMAN, CONRAD
ADAMSON, PROF. R. S.
ADAMSON, MRS. R. S.
Ainslie, Miss F.
Albrecht, C. W.
ALBU, SIR GEORGE.
Alderson, Miss D.
Alexander, Miss E. J.
ALI, H. H. PRINCE MOHAMED.
Allison, J.
Allison, Mrs. J.
Alston, Dr. J. A.
Alston, Mrs. J. A.
Amm, R. E.
Anderson, Mrs. E. J.
Anderson, Mrs. T.
Apsey, T. J.
Arbuthnot, Mrs. A.
Arbuthnot, Miss I.
Arderne, H.
Arkwright, W.
Armstrong, Mrs. W. H.
Arnot, Miss.
Ashley, Mrs. E.
Askew, F.
AUERBACH, MR. & MRS.
Augustus, I. S.

Babbs, A. J.
Babbs, Mrs. A. J.
Backhouse, J. S.
Backhouse, Mrs. J. S.
Baker, Mrs. C.
Baker, L.
Ball, W. R.
Ballantine, Dr. A. J.
Barclay, Miss D.
Barclay, Miss E.
Barnard, Dr. K. H.
Bartlett, Miss G.
Battenhausen, J. W.
Battenhausen, Mrs. J. W.
BAXTER, W. DUNCAN.
BAXTER, MRS. W. DUNCAN.
Bean, D.
Beard, Miss.
Beard, H.
Beard, H. R.
Beard, Mrs. W. A. M.
Beattie, Sir J. Carruthers.
Beattie, Lady.
Beaufort, Sir Leicester.
Beck, Lt.-Col., A. A.
Beck, Mrs. A.
Beck, Lady Meiring.
Beck, T. E.
Becker, Mrs. A.
Becker, T.
BEIT, SIR OTTO.
Bell, A. B.
Benjamin, Hon. Justice.
Bennett, A.
Bennett, H.
Bennett, Mrs. H.
BENNING, A. F. J.
BENTINCK, ADMIRAL SIR RUDOLPH.
Bernard, Mrs.
Bertram, Mrs.
Beverley, Miss M.
Biccard, G. J. V.
Biggs, Miss
Biggs, Miss G.
Bird, W. J.
Blackbeard, Miss G. I.
BLACKBURN, A. L.
Blackman, A. C. M.
Blake, Mrs. A.
Blake, Miss A.
Blenkins, Mrs. W.

Blohm, Rev. W.
Bobbins, Miss A. H.
Boddam-Whetham, Mrs. R. E.
BOLUS, MRS. F.
Bolus, H. H.
Booth, Dr.
Booth, Mrs.
Borcherds, Mrs.
Bowles, W.
BRAKHAN, A.
BREITMEYER, L.
Bright, H. Hepburn
BRIMBLE, L. A.
Brink, A.
Briscoe, Mrs. J. E.
Britten, Miss L.
Broom, Mrs. R.
Brown, Prof. A.
Brown, Mrs. M. G.
Brown, J. H.
Brownjohn, Miss
Brownlee, Lt.-Col. J. Innes
Brownlee, Mrs. J. Innes
Brydone, R. R.
Buckton, Mrs. F.
Buissinne, T.
Buissinne, Mrs.
Bull, Mrs.
Bullen, A. H.
Buller, A. C.
BULLEY, A. K.
Burton, Mrs. H.
Burtt-Davy, Dr. J.
Burtt-Davy, Mrs. A.
BUTCHER, H. J.
BUTCHER, W. E.

Caldecott, Dr. W. A.
Campbell, W.
Cape Peninsula Publicity Association (Subscriber).
Caplan, O.
Carter, Mrs.
Cartwright, F. E.
Cartwright, Mrs. F. E.
Cartwright, J. D.
Cavill, H. W
Chamberlain, Prof. C. J.
Chandler, Miss C.
Chaplin, Sir Drummond, K.C.M.G., M.L.A.
Chaplin, A. L.
Chubb, Dr. Elsie.
Churchill, Senator the Hon. F. F.
Churchill, Mrs. F. F.
Cillie, Dr. G.
Cillie, Mrs G.
Clark, Mrs. J. C.
Clarke, E. D.
Clarke, Miss E. V.
Clarke, G. E.
Clarke, H. C.
Clarke, J.
Cleghorn, C. R.
Cloete, Miss C.
CLOETE, MRS H.
Cloete, P. A. M.
Close, J. E. P.
CLOSE, ADV. R. W., M.L.A.
Cluver, A. H.
Cluver, Mrs. A. H.
Cluver, P.
Cluver, Mrs. P.
Cocksedge, C. F.
Coetzee, J. P.
Coles, Rev. H. J.
COLTON, MRS. W.
Compton, Prof. R. H.
Conradie, D. J.
Conradie, Mrs. D. J.
Cook, Miss.
Cook, Miss A. D.
COOPER, H. J.
Copenhagen, Mrs. J. W.
Corbett, Mrs. A. E.
COSTER, M. S.
COUPER, J.
Coutts, Miss E.
Coutts, Mrs.
CRAIG, W. J.
Crampton, W. Morley
Cruikshank, Miss M.
Cudworth, Mrs.
Cummings, Miss A. M.
Currey, Hon. H. L.

Dale, D.
Dale, Mrs. H. R.
Dallas, Mrs.
DALRYMPLE, COL.
Daneel, Dr. P. M.
Darter, E. L.
Davies, V. C.
Davis, M. L. de Waal
Dawson, E.
Day, Mrs. M. J.
De Beer, Mrs. A. A.
De Kock, K.
De Korte, Dr. W. E.
Delbridge, Miss
DE LINT, DR. R.
Denham, Mrs H. G.
DE VILLIERS, LORD
De Villiers, A.
De Villiers, Mrs. A.
De Villiers, Mrs. B.
De Villiers, Mrs. C. C.
De Villiers, Miss E.
DE VILLIERS, LOCHNER
De Villiers, Hon. Justice M.
De Villiers, Mrs. M.
De Villiers. P. H.
De Villiers, Senator
De Villiers St. School, Cape Town.
De Wet, H. C.
Diamond, Mrs. F. W.
Divine, Mrs. F.
Dix, H. H.
Dix, Mrs. H. H.
Dockrall, A.
Dockrall, Mrs. A.
Dockrall, T. A.
Dockrall, Mrs. T. A.
Donovan, Capt.
DOSE, W. K.
Douglas, Mrs. A.
Douglas, J.
Downes, Major H. M.
Dowson, Miss E.
Drake, Miss C.
Dreyer, Miss V.
Duckett, Mrs. C. J.
Duff, J. A.
Dugmore, Miss H.
Duncan, E. C.

DUNN, MISS A. A.
Dunn, Miss L. C.
DUTHIE, MISS A. V.
Du Toit, Mrs. A.
Du Toit, Miss M. E.
Dykes, W.

Eales, Mrs. H. M.
Earle, Miss K. M.
EAST, H. F.
Eastman, A. E.
Eastman, Mrs.
Eastwood, A.
Eaton, Miss M.
EATON, W. A.
Eccles, J. H.
ECKSTEIN, F.
Eddy, Miss D. M.
Edgar, Prof. C. S.
Edgar, Mrs. C. S.
Edington, T.
Eldred, H. W.
Ellerslie Girls' School, Sea Point (Standard IV.).
Ely, Mrs.
Ettmann, Rev. C. E.
Eyles, F.

Fairbairn, J.
Fairbridge, Miss D.
Felbert, T.
Finch, J. R.
Findlay, G. M.
Findlay, G. Stuart
Fisher, Miss M. L.
FitzHugh. Mrs.
FLANAGAN, MRS. F.
Foley, W. J.
Forbes, Dr. Gordon
Forest Dept. (7 Associates)
Forsyth, A.
FRAMES, P. ROSS
French, C. J.
Friedlander, Mrs. A.
Froembling, Dr. W.
Fuller, A. J.
Fuller, Dr. E. B.
Fuller, Mrs. E. B.

Galpin, E. E.
Galpin, H.
Galvin & Sales, Ltd.
Gamble, Miss A.
Garabedian, Miss S
Gardener, W. C.
Gardiner, Hon. Justice
Garland, Miss M.
GARLICK, J.
GARLICK, R. C.
GARLICK, MISS W. M.
Garnett, G. S. B.
Garraway, Lady
Gee, Miss E. A.
Gemquand, Miss M. E.
Giffen, M. H.
Girls' High School, Oudtshoorn.
Godbold, A. B.
Godfrey, Miss
GOHL, J. C.
Goldman, Mrs. H.
Goldschmidt, Mrs. N.
Goodman, Dame Alice
Goodman, Mrs. Gwelo
Gordon, Col. W. A.
Gowie, W. R.
GRAAFF, HON. SIR D. DE V.,
GRAAFF, SENATOR THE HON. SIR J. A. C., K.C.M.G.
Graham, Miss E.
Grant, Mrs. A. J.
GRAUMANN, SIR H.
GREENACRE, W.
Greene, Mrs. G. A. L.
Grobbelaar, J. J.
Groom, Miss D.
Grover, Major P. G.
Groves, C. S.
Groves, Mrs. C. S.
Guthrie, Miss L.
Guthrie, Mrs. Murray

Haagner, Dr. A. K.
Hall, Mrs. E. R.
HALL, MRS. J. C.
Hands, Sir H., K.B.E.
Hare, R. E.
Harper, A. B.
Harper, W.
Harris, Mrs. C. C.
HARRIS, SIR DAVID, K.C.M.G., M.L.A.
Harris, Mrs. E. W.
Harris, Dr.
Harsant, Mrs. J. W.
Harsant, Mrs. S.
Hart, Mrs. S. M.
Haumann, J. S.
Haupt, F. J.
Haupt, Miss L. J.
Hayes, Mrs.
Hayward, Mrs.
Hayward, Miss H.
Hazell, R. W.
Head, J.
Heil, F. J.
Hellet, Mrs. M.
Henderson, Mrs. H. S.
Henderson, W. H.
Hennessy, Sir A.
Henshilwood, Mrs. A. J.
Henshilwood, T.
Herman, Dr. C. L.
Hermans, Mrs. H. W.
Herz, L.
Hewat, Dr. B.
Hewat, Mrs. M.
Heyneke, Mrs. P.
Heynemann, J.
HEYNES MATHEW, LTD.
Heywood, Mrs. M. C.
Heyworth, Miss
Hill, A. G.
Hilditch, C. H.
Hirsch, Mrs.
HIRSCHORN, F.
Hodges, Rev. C. J.
Hodges, Mrs. C. K.
Hodges, Miss M.
Hodges, Miss N.
Hofmeyr, S. J.
Holland, F. H.
Honey, T.
Hooper, H. C.
Hooper, V. E.
Hopkirk, Miss L.
Horn, Miss E. F.
Horne, P. Stuart
HORTORS, LTD.
Howie, C.
Howes, F. N.
Hoy, Sir W. W.
Hoy, Lady
Hudson, Miss
Hughes, Col. A. M., D.S.O.
Hughes, J. H.
Hugo, Dr.
Humby, A. J.
Humby, Mrs. A. J.
HUMPHRIS, H. W.
Hunt, H. F.
Hunt, W. P.
Hunter, S. J.
Hurtzig, Mrs. L.
Hutchinson, Miss P.
Hutchinson, R. W
Hyland, C. W.

Ince, J. S.
Ingleby, Col. T. J. J.
Inglis, M. C.
Imray, Miss G.
Irving, Mrs. M.

Jacoba, Rev. Mother M.
JAGGER, HON. J. W., M.L.A.
James, C. E.
Jamison, Mrs. R.
Jardine, Major
Jeffrey, A. H.
Job, G. A.
JOEL, S. B.
Joffernbruch, Miss L.
Johns, Miss M.
Johnston, Dr.
JOHNSTON, C.
Jones, Miss A. V.
Jones, Mrs. F.
Jones, A. G. Twentyman
Jones, H.
Jones, H. T. Twentyman
Jones, Miss L.
Jones, Miss M.
Jones, Miss I. H.
Jones, W.
Jooste, Mrs. E.
Joubert, Miss
Joubert, Miss L. I.
Juritz, Dr. C. F.

Kanner, J.
Karstel, F. K.
Keegan, W.
Kemp, Miss C. L.
Kendall, F. K.
Kensit, Miss
Key, K.
Key, A. C. H.
Kilpin, Sir E., K.C.M.G.
Kimberley Public School
King, Miss F.
Kingon, Miss H. A.
Kingsley, C.
Kisch, Miss M.
KNIGHT, C. H.
KNIGHT, MRS. C. H.
Knight, C. M.
Knight, H.
Koch, Miss D.
Kolbe, Mgr. Dr. F. C.
Kooy, Dr. F. H.
Krige, J. D.
Krige, Mrs. J. D.
Krige, W. G.
Krige, Mrs. W. G.
Kruijff, D. J.
Kupfenburger, Miss K.

Landon, Mrs.
Langford, J. H.
Langridge, Mrs. G. L.
Lawrence. C. W.
Lawrence, Sir W.
Lehfeldt, Mrs.
Lehman, W. F.
Leibbrandt, Mrs.
Leipoldt, Dr. C. L.
Lenz. Mrs. M.
Le Roux, Mrs. J.
Leslie, J. B.
Leslie, T. N.
Lester, Mrs. E. H.
LEVICK, SIR HUGH
Levyns, Mrs.
Lewis, G. H.
LEWIS, ISAAC
Lewis, I.
Lewis, L.
Lewis, Mrs. L. A.
Lister, J. S., I.S.O.
Loftus, Miss M.
LOUW, MISS I. M.
Low, J. D.
Low, W. H.
Lucas, W. de N.
Luckhoff. Dr. J. D.
Lundie, Dr. C.
Lunnon, Mrs. J. J.
Lyon, Mrs. G. W.
LUYT, P. J.

McCallum, A. J.
McConnell, D. E.
MCCULLOUGH, D.
McDonald, Mrs. A. B.
McDONALD, J.
McDonald, R. L.
McDonald, Miss M.
Macfie, J. G.
McGill, Mrs. D.
McGregor, Hon. Justice
McIver, Miss M. C.
McKelvie, J.
MACKENZIE, H.
Mackeurtan, Mrs. H. G.
Mackinlay, J. W.
McLaren, H. D.
McLaren, J.
McLean, Professor F. T.
MCLEAN, MRS. M. C.
McMullen, Miss N.
McNab, R. B. H.

Madelaine.
Magennis, L.
Magennis, W. B.
Malan, Miss M.
Malleson, P. R.
Malleson, Miss U.
MALLY, DR. C. W.
Mann, A.
Mann, G.
Marais, Miss A.
Marais, Miss C.
Marais, Mrs. P.
Marchant, Rev.
Marchant, Mrs.
MARKHAM, LADY
Marloth, Dr. R.
Marquard, Mrs. W.
Mars, Adv. W. H.
Marshall, Miss A.
Marshall, Miss R.
MARSHALL, W.
Marx, Mrs. C.
Mason, Miss M. H.
Massey, G. D.
Massey, Mrs. G. D.
Matheson, Mrs. M. A. M.
Mathews, J. W.
May, A. G.
Meager, P. A.
MEIKLE, J.
Meikle, J.
Merriman, Rt. Hon. J. X.
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OBJECTS:

(*a*) To encourage the inhabitants of South Africa to take an active part in the progress and development of the National Botanic Gardens at Kirstenbosch, a part of the Groote Schuur Estate, in the Cape Province, and to induce them to appreciate their responsibilities therein.

(*b*) To augment the Government grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch.

(*c*) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

(*d*) To enlighten and instruct the members on botanical subjects by means of rambles, meetings, lectures, and conferences, and by the distribution of literature.

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Large specimens of Tree Ferns should be bound in wet grass or canvas, or with damp moss inside the canvas and the stems should be strengthened with poles.

Ferns, Bulbous and Tuberous Plants in growth and flower need a little damp moss among the roots.

Distinct species of dormant bulbs and tubers, as well as of seeds, should be sent in separate wrappers.

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Edited by R. H. COMPTON, M.A., F.R.S.S.Af., Director of the NATIONAL BOTANIC GARDENS :: :: :: KIRSTENBOSCH :: :: ::

Part XII. 1926

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Photo: R. H. Compton.

Plate I. Snow Drifts at Kirstenbosch.
(*Dimorphotheca pluvialis*).

The Journal of the Botanical Society of South Africa.

EDITED BY R. H. COMPTON.

PART XII. 1926

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South African Plants grown at Kirstenbosch (Photographs by R. H. Compton) .. Plates IV. & V.

News and Notes.

THE following table shows the growth in membership of the Botanical Society since its foundation.

	Life.	Family.	Ordinary.	Associates.	Total.
1914	33	32	264	33	352
1915	46	26	263	32	367
1916	49	26	264	45	384
1917	46	24	249	53	366
1918	49	28	281	78	436
1919	50	38	320	84	492
1920	54	45	384	237	720
1921	54	48	407	287	795
1922	55	52	418	301	826
1923	59	50	405	269	783
1924	62	57	455	313	887
1925	62	58	462	330	912

The figures indicate a steady increase in the degree of public support given to Kirstenbosch, though the rate of increase is not so rapid as the objects of the Society deserve. The majority of members, as is natural, live in the Cape Province; but there is every reason why residents in the other provinces of the Union should support an institution which is national and not merely local. A special appeal is now made to members of the Society to do what they can — and they can do much — to bring the aims of Kirstenbosch to the notice of their friends, and to secure their adhesion to the Society. An application form is enclosed with this Journal: let every Member and Associate persuade a friend to make use of it without delay. Subscriptions paid now count for 1927 as well.

* * * * *

The Annual Reports and Balance Sheets of the National Botanic Gardens have recently been distributed to Members of the Botanical Society. In addition the Trustees have prepared a Memorandum in a less matter-of-fact form than the Reports for inclusion in this Journal: and this deals with the progress of Kirstenbosch and Whitehill in the past and the prospects for their future.

* * * * *

In response to requests, we print the Constitution and Rules of the Botanical Society as amended to date. The original pamphlet has long been out of print, and various changes have been made from time to time in the light of experience. Separate reprints are being made and will be available for new Members of the Society.

* * * * *

Botanical science is blessed in possessing a singularly rich, beautiful and expressive nomenclature and terminology. It has grown step by step with the growth of knowledge and the perception of relationship. Founded on the great classical languages it is for the most part dignified and euphonious, and has the great merit of being international. Its vastness is a shadowy reflection of the infinite variety of nature, and of the multitude of facts for which the human mind demands classification and order. The interest of nomenclature is immense, and in the following article Miss F. M. White has brought together a few examples of the way in which botanical names have arisen, which will be illuminating to those who regard them as an unnecessary jargon.

* * * * *

The inspiration that Kirstenbosch has given to South Africans to grow the plants of their own country can be traced from end to end of the Union, in both public and private gardens. Our native plants have a charm and delight which is absent from the regular cultivated garden stock, beautiful as these may be: and to grow them is to recall their homes in mountain and vlei and on many a stretch of flower-bespangled veld. In a garden of S. African plants each flower tells its story and has its associations. In the following pages Miss Edith Struben describes a South African garden — not far from Kirstenbosch itself — and tells what can be done by love and work, and what satisfaction can be got from it.

* * * * *

Mr. J. W. Mathews, Curator of Kirstenbosch, continues his series of notes on some of the native plants grown in the Gardens: and photographs are published which may recall, however imperfectly, the plants themselves to those who have seen them in all their loveliness of form and colour at Kirstenbosch.

* * * * *

Through the courtesy of Mr. A. Elliott, the well known photographer, we are able to publish Plates II and III, representing the Harold Pearson Memorial Hostel and the Kirstenbosch Tea House respectively. Plate II shows the

exterior of the Hostel as seen from the East, and also a view of the central dining room with a portrait of Pearson at the end. A description of the Hostel and the purposes it serves was published in last year's issue of this Journal (Part XI). Plate III depicts the exterior and interior of the Tea House. Both buildings were designed by Messrs. Walgate & Elsworth of Cape Town, and combine usefulness with beauty and fitness to their setting.

* * * * *

In the House of Assembly, on 4th May, 1926, the Minister for the Interior made the first public statement of an agreement by which the Government contributes to the funds of Kirstenbosch on the £ for £ system on the basis of donations and bequests. THE RESULT OF THIS IS TO MAKE EVERY GIFT OR LEGACY TO KIRSTENBOSCH OF DOUBLE VALUE: there is therefore an additional incentive to benefactors to assist in the development and equipment of the Gardens, knowing that for every pound they give the Government will provide another. Kirstenbosch has been supported in the past to a very large extent by private generosity: the Government has now declared its intention through the Minister of the Interior, of recognising this private support and making special grants in accordance with it.

* * * * *

The number of visitors at Kirstenbosch continues to increase and the figures for 1925 show a considerable advance on those recorded for previous years. Only Saturday afternoons, Sundays and Public Holidays were taken into account, the attendance on ordinary weekdays not being included in the returns. The totals for the last four years were as follows:—

1922	..	26,417
1923	..	28,241
1924	..	43,619
1925	..	56,312

The attendance has therefore practically doubled in three years. There is every reason to suppose that as the Gardens develop and become intrinsically more beautiful and interesting and as they become more accessible, so the number of visitors will continue to increase.

* * * * *

The monthly gatherings of members of the Botanical Society and their friends have taken place regularly at Kirstenbosch on the third Saturday of each month. The Curator, Mr. Mathews, has given a series of most useful demonstrations of practical gardening, using indigenous plants as his subjects. Several parties have been taken round the Garden by the Director, Professor Compton. Recently special lecturettes have been given by Professor Adamson, Miss E. L. Stephens and Mrs. J. E. P. Levyns of the Cape Town University Botanical Department; and sincere thanks are due to them for the way in which they gave their services to the Society. The audiences at the gatherings have been disappointingly small, and unless an improvement takes place it will be necessary to discontinue them, for it is not reasonable to ask busy people to give time and trouble in preparing and delivering addresses to a Society whose Members show so little appreciation of what is being done for them.

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The Nature Study classes conducted daily at Kirstenbosch by Miss Starke, under the auspices of the School Board, are playing an important, if limited, part in the education of the children of the Cape Peninsula. Four times a year each child has the opportunity of seeing and handling natural objects for himself, in the open air under competent guidance. The chief criticism which can be made of this arrangement is that the amount of time thus spent in open air studies is altogether too restricted: one day a term is ridiculously little considering the vast educational importance of the study of nature, and it would be far better to sacrifice some of the endless class-room drudgery in favour of this open air work. Miss Starke's single-handed labours should be reinforced by the appointment of additional teachers, and every child should come to Kirstenbosch (or other natural localities, such as the sea-shore or the vleis) at least once a fortnight, or better still once a week.

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And yet it is rumoured that some people would like the Nature Study classes to be given in a class-room in Cape Town! This would sacrifice everything that is valuable in the scheme. One might as well try to study art in a coal-cellar or music in a boiler-factory. Chalk and duster are no substitute for life and light.

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The Harold Pearson Memorial Hostel at Kirstenbosch was occupied in September 1925 and has proved a great assistance to the work of the Gardens. Under the wardenship of Mrs. Stow, the women working at Kirstenbosch have been accommodated in comfortable and pleasant surroundings at a reasonable charge. Accommodation is often available at the Hostel for short or long periods for teachers, artists, naturalists and any who desire to take advantage of the opportunities afforded by Kirstenbosch for study or research. The Lady Warden will be glad to send particulars to those interested.

The Nursery Buildings on the new site at Kirstenbosch have been completed and have already proved their value, demonstrating once again that a wise expenditure of funds is the truest road to economy and satisfaction. The conditions are now such as to render possible a greatly increased output of better work than before. An office for the Curator is provided; there are two glass-houses, one for winter storage and propagation of damp-sensitive succulents, the other for early propagation of decorative material; each glass-house has its own well-equipped potting shed, frames and standing-out ground; there are also a packing and unpacking room and a workshop. The buildings are solidly constructed in concrete and thatch and were built departmentally, the cost being only £711. The funds were provided entirely by voluntary donations aided by a £ for £ grant from the Government.

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By the will of the late Dr. de Korte of Cape Town, who died this year, Kirstenbosch will benefit to the extent of £2,000. Dr. de Korte's main interest was in research work, and it may be that he saw in Kirstenbosch an institution which if adequately financed might make notable additions to human knowledge. This is the first four-figure bequest that has been made to the Gardens. The example is a good one and can be commended to all who wish Kirstenbosch well and would like to secure her future in a world of change. It is proposed to apply the De Korte bequest to various improvements of a capital nature at Kirstenbosch, and the Government has already promised a £ for £ grant on the basis of the first instalment of £1,000 which it is anticipated will be paid over this year.

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At the Annual General Meeting of the Botanical Society held on 31st March 1926 it was unanimously resolved to confer Honorary Life Membership of the Society upon Dr. Rudolf Marloth "in recognition of the valuable services he had rendered to the botanical world."

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Mr. F. W. Metelerkamp, who has recently been transferred from the magistracy at Tulbagh, has presented to Kirstenbosch a magnificent collection of indigenous bulbs which he and Mrs. Metelerkamp have collected and cultivated in their private garden. So far (Oct. 18th) about 13,000 seedlings have been brought to Kirstenbosch, and the fully grown bulbs are being moved shortly. Sincere thanks are due to Mr. and Mrs. Metelerkamp for their generosity: it must have been a severe wrench to part with bulbs which represented the results of so many journeys and toils, but it will be a satisfaction to them to know that the national collection is considerably enriched by the gift.

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The Karoo Garden at Whitehill has made very satisfactory progress during the past twelve months. A well has been dug by the Railway Department in the alluvial ground adjoining the Baviaans River and a wind pump installed. This supplies water for domestic purposes to the railway foremen's cottages, and the surplus is available for the garden. A reservoir has been dug at the highest point of the garden to store water up to a capacity of about 14,000 gallons. Piping and accessories to a value exceeding £50 have been presented by Mr. Edward Rowe, to whom sincere thanks are due. When the system is completed it will be possible to supply water to all the parts of the garden at present under development. Valuable plant material has been collected in the Ladismith, Calvinia and Uitenhage districts by the Curator, Mr. J. Archer; and Sir Percy Fitzpatrick gave him great assistance in his visit to the last named locality.

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There have been numerous visitors to Whitehill, which is very easily accessible from Matjesfontein. At the end of September a party of University botanical students, under the leadership of Professor Compton and Miss Stephens, camped at Whitehill, studied in the Garden and explored the surrounding district. They were accompanied by Dr. J. P. Lotsy and Miss Lotsy; and Dr. Schröter and Dr. and Mrs. Huber-Pestalozzi visited the Garden at the same time.

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The Council of the Botanical Society collaborated with the Royal Society of South Africa in entertaining to luncheon on 21st September 1926 the distinguished Swiss botanist, Dr. Carl Schröter and his travelling companions Dr. and Mrs. Huber-Pestalozzi. The luncheon took place at the Railway Station Restaurant, and a very representative gathering assembled. The toast of the guests was proposed by Professor Ogg, the President of the Royal Society. Dr. Schröter made an interesting speech in reply, and speeches were also made by Professor Crawford (for the Royal Society) and Professor Compton (for the Botanical Society).

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Dr. Schröter, who is making an extensive tour of the Union and Rhodesia, is on the botanical side one of the founders of the branch of study known as Ecology. His work has lain chiefly in Switzerland, and he has an unsurpassed knowledge of the vegetation of the Alps. He is

Photo: A. Elliott.

Plate II. The Harold Pearson Memorial Hostel.

also one of the leaders of the movement in favour of the preservation of wild life, and the Swiss National Park is a lasting result of his enthusiastic and far-seeing efforts. Dr. Schröter visited Kirstenbosch and Whitehill, and was much impressed with the work being done there.

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Dr. Huber, who is accompanying Dr. Schröter on his tour, is a well-known surgeon of Zurich, and a keen amateur botanist, being especially interested in the remarkable group of Algae known as Peridiniales. Mrs. Huber is a grand-daughter of Pestalozzi the celebrated educationalist; she is acting as photographer to the party.

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Dr. J. P. Lotsy, the celebrated botanist, formerly Professor at the University of Leyden in Holland, is on a visit of several months to South Africa. He is distinguished as an original investigator in plant morphology, and as the author of the monumental "Vorträge über botanische Stammesgeschichte" and of books on evolutionary subjects, and also as the editor of several important periodicals. Of recent years he has been the protagonist of the theory of evolution by means of hybridisation and segregation, and during his journey in this country he is giving lectures on the subject at University centres and collecting new material for study. He is accompanied by his youngest daughter, and both have already made many fast friends at the Cape.

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Dr. Lotsy was specially interested in the natural hybrids between the boterboom (Cotyledon paniculata) and the kandelaar (Cotyledon Wallichii); a whole series of these were found growing with their parents by the University botanical excursion near Tweedside. The records of hybrids in the South African flora are extremely scanty: it is certain that many must exist in localities where two or more species of the same genus grow together, provided they flower at the same time. Specimens of natural hybrids which are found will be most gratefully received at Kirstenbosch, especially if accompanied by the supposed parents.

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The progress of Kirstenbosch can be illustrated by the part it has played in the Cape Town Wild Flower Shows. Six or seven years ago a bench about eight feet long was sufficient to carry the Gardens exhibit; at the recent shows the whole of one side of the City Hall has been adequately filled, and even over-crowded, by the specimens exhibited, (only one vase being shown of each variety). But the flowers seen at the Show are a mere sample, taken at one period, of the floral wealth of the Gardens: Kirstenbosch itself must be visited, and at every season, to obtain a true impression of the work that is being done there.

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The country Wild Flower Shows have been marked on the whole by good arrangements of flowers which have been of excellent quality. We wish, however, to join in the protest which has been raised against the appalling waste of flowers which takes place in connection with these Shows, and the way in which the commercial and the flamboyant impulses tend to prevail over quiet appreciation and artistic restraint. Much lip-service is paid to wild-flower-protection on these occasions; but the Shows themselves are often regarded as excuses for sweeping the whole district clear of flowers. For Show purposes three specimens are usually better than three hundred, and some of the massed effects produced are distressing both to the mind and to the artistic sense. Would anyone rob his own garden for a Show to the extent that the veld is robbed on these occasions? Yet he would be far more justified in doing so.

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Of all the flagrant evils which go on unchecked in South Africa, none is more obviously inimical to the future of the country than the practise of burning the veld. It is condemned alike by scientists, water engineers, irrigators, meteorologists, lovers of good scenery, and by almost all progressive farmers; yet under the present *laisser faire* system, the ignorant herdsman with a few cows and goats is able to destroy the vegetation over countless miles of country, to dry up springs, impoverish the soil, promote erosion, spoil scenery, and in short, to cause devastation in a land to which he renders no appreciable service. The remedies have been advocated officially and unofficially for years; but nothing has been done to check the destruction which is taking place annually, except in a very local and spasmodic way. The question should be in the forefront of our national problems, and no further time should be lost before a solution is found and put into practice.

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The establishment of the Kruger National Park in the Transvaal is a matter for sincere congratulation to the people of South Africa and to the Government. It should not, however, be regarded as a final achievement; but rather as the first of several great South African Nature Reserves. Every year it becomes more difficult to establish Reserves, and every year the tendency of native

flora and fauna to alter or disappear becomes accentuated. Each Province should have at least one Reserve on a large scale; and we strongly urge the Government to take steps to enquire into the possibility of establishing them. In the Natural and Historical Monuments Commission there exists a body, drawn from all the Provinces, to whom this work could well be entrusted. South Africa needs Nature Reserves as much as or more than most countries, but she lags far behind the United States, Canada, Australia, Switzerland, etc., in the provision so far made for these wild life sanctuaries.

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A recent threat to the Game Reserves of Zululand was fortunately not realised, owing to the firm attitude adopted by the Natal Provincial Council, and the animals (of which the white rhinoceros and the inyala are the most noteworthy) continue to enjoy a measure of protection in these areas. The danger, however, forces one to realise how important it is that the reserves should be set on a secure national basis; so that our most noteworthy and irreplaceable fauna and flora should be placed beyond the reach of temporary expediency.

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There exists on the Statute Book a "Wild Birds Export Prohibition Act;" this became law on 2nd May 1925, and its object is to check the enormous and destructive traffic in wild birds. During the first 12 months since the Act came into force, according to a reply given in Parliament by the Minister for Agriculture to Mr. Close, no fewer than 11,515 wild birds were exported under permit. It was stated that these were mainly for consignment to overseas zoological gardens. The number appears altogether excessive, and there is a very strong suspicion that the permits have been misapplied; and that letters of recommendation from overseas zoological gardens have been used to cover ordinary commercial traffic in birds. The most careful scrutiny should be given to all applications for permits, and the directors of the overseas zoological gardens in question should be asked to state definitely the number of birds required and to certify that they are purely for zoological purposes. Otherwise the Act will be useless and the scandal will continue.

The Development of Kirstenbosch.

A MEMORANDUM BY THE TRUSTEES OF THE NATIONAL BOTANIC GARDENS.

IN accordance with practice reports by the Director and the Curator, upon the work of the last year, have been published.

The Trustees, however, believe the public may welcome further information of a more general character, and have therefore prepared a brief review of past work, with some observations upon the present situation, and the requirements of the future.

Since Parliament sanctioned the establishment of the National Botanic Gardens in 1913, something has been accomplished, but the rate of progress has been governed by the available funds and is not commensurate with the merits of the object.

The following particulars give a rough idea of the work done:—

The area now under a greater or less degree of cultivation with indigenous plants can be estimated at about 35 acres. Much of the old Kirstenbosch area is covered with plantations of pine and gum and these are forested for commercial ends. The remainder which may be estimated at about 1,000 acres, consists of indigenous vegetation, and care and protection are exercised to prevent fires and check the spread of exotics: the object being to create a Nature Reserve in which natural conditions shall prevail as far possible.

Every part of the cultivated area is readily accessible by means of roads and paths, the most important of which are provided with efficient storm-water drainage, and which run to about fifteen miles. The Contour Path at 1,000 ft. altitude is one of the most beautiful walks in the Peninsula; and good tracks up Skeleton and Nursery Gorges give ready access to the Lower Plateau of the Mountain.

The water supply of the gardens is now very extensive, and is derived from two dams in Nursery Stream. All the scattered buildings are supplied, and there are large numbers of standpipes, etc., for garden watering over most of the cultivated area.

The buildings include Offices, Potting Sheds and Glasshouses, the Harold Pearson Memorial Hostel, residences for the Director, Curator and Ranger, six small cottages

for gardeners and labourers, and the Tea House, the latter being built amongst the oaks on the original site of the old homestead: and the University of Cape Town has erected the Bolus Herbarium on a site presented by the Trustees.

The principal features of the Gardens are the Protea Garden, the Horseshoe Path, the Cycad Amphitheatre, the Fern Dell, the Composite and Pelargonium Gardens, the Mesembrianthemum Garden, the Aloe Kopje, the Heath Garden, the Terrace and the Great Lawn with its ornamental water, all of it backed by the wooded slopes and precipices of Table Mountain. Development is taking place in the Heath Garden, the Karoo Garden, the Protea Garden and the new Nursery, and improvements are being made on all sites. Other items of interest are the old bath, fed by the spring in the Fern Dell, the sun-dial presented by Dr. Halm, and Harold Pearson's grave amongst the Cycads.

Private benevolence in 1921 secured, and placed under the direction of the National Botanic Gardens, an area at Whitehill in the Karoo, where special attention is devoted to the flora of that arid region.

The Trustees do not claim that, at Kirstenbosch and Whitehill, every species found in the Union can be cultivated under the best conditions, but it may be confidently asserted that the great variation in climate, soil and elevation of these combined localities affords a suitable home for nearly all varieties.

The late Professor Pearson, to whose inspiration and enthusiasm the gardens owe their origin, classified our flora as ranking third in the Botanical world. We may be proud of that distinction, but should remember that, the gift was bestowed by nature. Its very lavish magnificence imposes a duty upon those in whose custody it is placed. Pride of possession would be a mere hollow conceit, a species of unworthy boastfulness, unless the potentialities are explored with intelligent assiduity, and the splendour of the site, as well as the rare examples of plant life are protected and cultivated with tender care and zeal.

In the economic work now being carried on, a large number of plants of reputed value in pharmacy, perfumery, etc., are in cultivation, and distillations are being made. Pioneer work is being done and has already given valuable results, and it is true to say that we are merely upon the threshold of knowledge respecting the material, medicinal, and aesthetic value and attributes of our indigenous vegetation.

The indigenous plants cultivated at Kirstenbosch have almost all been voluntarily sent by the public, no fewer than 32,647 contributions of seeds, plants, etc., having been received to the end of 1925.

Kirstenbosch is a great asset to the Schools of the Peninsula. Classes from the various Schools are sent in rotation and receive Nature-study lessons from a teacher on the Itinerant Staff of the School Board. Students in training for the teaching profession also receive instruction on Saturdays. The pupils take a keen interest in studying plant and animal life in their natural surroundings and keep records of their observations.

There is every reason to expect that year by year the number of tourists to this country will increase, and if the fame of the National Botanic Gardens grows at the same pace as it would be possible to enlarge the variety and luxuriance of our unique flora, many travellers from afar with a knowledge of the subject would be attracted to the Union. There is indeed only one Kirstenbosch, not only in name but in allurement, in the world.

The growing popularity of the Gardens is already partly evidenced by the increasing numbers of the visitors to them: for instance, during 1925, on Sundays, Public Holidays and Saturday afternoons alone, 56,312 persons entered the gates, as compared with 43,619 in 1924 and 29.241 in 1923.

The work done so far may be regarded as a beginning. Much of it ought to have been done, by means of liberal capital grants, during the first two years of the Gardens' existence, and great economies and improved results would thereby have been rendered possible. It has taken, however, thirteen years of makeshifts and contrivances, waste and vexation, and of a fixed determination to surmount difficulties, to reach the present point. The initial work is in fact not yet done, neither in regard to buildings nor in sites for the principal classes of plants.

The present financial resources only permit the maintenance of the existing establishment, but are not sufficient to provide for the expansion of the Gardens. There is hardly a limit to their possible development, but even modest and continuous progress must depend upon a gradual increase of revenue. The Trustees do not put forward this statement as a complaint but as a fact.

The Government has demonstrated its appreciation by giving generous support out of State funds, the Municipality of Cape Town and Suburbs as well as the Divisional Council of this area have contributed and the Botanical Society of South Africa has aided to the full extent of its resources both towards revenue and with capital sums

for development. Generous gifts in money and in kind have also been forthcoming, and bequests have been made by the late Dr. de Korte, Mrs. Cavanagh and Mr. Stegmann. A Research Scolarship has recently been founded by Mrs. Solly.

The burden has so far been carried mainly by the Cape Province, and indeed there is some ground to fear that in the Union at large the National Botanic Gardens are not regarded as a national asset, which is essentially the case, but as a Western Province or Cape possession. If the Gardens are to fulfil their object, wider public interest is required. Every individual who gives his help in any form adds to the collective influence exercised; with larger means progress would be more rapid, more conspicuous, and more economical; and by concentrating, as far as possible, at the incomparable location of Kirstenbosch the best results for the fame and material benefits connected with our plant life will be attained.

The Trustees, with the aid of their skilled and enthusiastic staff, endeavour to supervise the operations, and to obtain the best results for the expenditure incurred, but they hardly regard it as within their functions to appeal for funds; nevertheless they deem it their duty to place the situation frankly before the public and to point out one direction in which individuals can help. Every additional subscriber to the Botanical Society of South Africa becomes *ipso facto* a supporter of the National Botanic Gardens. Full membership only involves an outlay of one guinea per annum and a form of application for membership is enclosed. The Trustees will also welcome any gifts sent direct to them through the undersigned, by whom they will be officially acknowledged.

Published by order of the Trustees.

(Signed) J. W. STEYTLER,
Secretary.

Kirstenbosch Affairs in Parliament.

DURING the discussion on the Estimates for the Department of the Interior in the recent session of Parliament, attention was again called to the inadequacy of the Government grant in support of the National Botanic Gardens. Remarks were also made by Members on the importance of a medicinal investigation of indigenous plants. The Minister of the Interior (Dr. D. F. Malan) replied to the criticisms made by Major G. B. Van Zyl, Advocate R. W. Closee and Mr. G. A. Louw, and expressed his sympathy for Kirstenbosch: he made the statement, which is of first class importance to the finance of the Gardens, that the Department had agreed to contribute to the Gardens on the Pound for Pound system on the basis of bequests and donations. This matter is referred to elsewhere in these pages. Readers may be interested to have the following extracts taken from the debate as published in Hansard.

3RD MAY, 1926.

Maj. G. B. Van Zyl: . . . . I should like once again to refer to a report of a commission appointed by the Government, the members of which were all notable persons, Dr. Peringuey, Mrs. Bolus, F. E. Cartwright, Prof. Compton, Prof. Moss and Prof. Thoday. This report was submitted to the Government in 1922 and exceept for small increases given to Kirstenbosch on the estimates last year and this year, very little has been done in the matter. In this report the whole matter of the work at Kirstenbosch and the requirements of Kirstenbosch for the future is gone into, and on page 8 reference is made to the plants of the Karoo. I wish to refer to what is therein stated, so give the following extracts:—

> " Meanwhile thousands of specimens representing the unique and astonishing succulent and bulbous flora of the Karoo and other arid districts, languish in tins or formal beds in the Nursery. It is a matter of the greatest urgency to get the Karoo garden into condition for the reception of these plants, but money is not available. And what is more, when established the garden will need the most careful and skilled maintenance — as much or more than any other section of the work. The results will be worth while from every point of view. With the accessory Karoo garden at Whitehill, we have a great opportunity for the study of these characteristically South African plants — a study now left to Kew and La Mortola. . . . . "

Mr. Close: . . . . Another matter to which I would like to refer is the question of Kirstenbosch. I am quite in accord, as I expect every man in the House is, with the remarks made by the Hon. Member for Cape Town (Har-

Photo: A. Elliott.

Plate III. The Tea House at Kirstenbosch.

bour) (Maj. G. B. Van Zyl) in connection with the desirability of investigating our own natural herbs and plants in this country. Kirstenbosch is, of course, an ideal place for experimental plant work of all kinds and, while one is glad to see a sum of £1,750 on the estimates, I think the Government would be acting really economically if they increased the vote for Kirstenbosch for the purpose of enabling research and experimental work to be done there to a far greater extent than is possible now.

Mr. G. A. Louw. . . . . We know how in the past very little attention was given to the national flowers of the country and how they are now sought after and have already become world famous for their beauty and quantity. When we come to our plants we find it is just as important or even more so, especially for anyone living on the Karoo . . . . I think if we make a study of our own plants and bushes we shall find they are better than the imported ones. . . . . As for the medicinal qualities of bushes . . . . it is time to make a commencement, because the old people who have used the bushes as medicines — and even the natives and old Hottentots — are disappearing . . . . . I hope the Minister of the Interior will go into the matter and make a commencement with the investigation of our plants so that we can know more about their qualities as medicine and as foodstuffs and of the possibilities of poisoning.

4TH MAY, 1926.

The Minister of the Interior: . . . . The Hon. Member for Colesberg (Mr. G. A. Louw) pointed out that it was advisable that enquiries should be made into the curative value of bushes. I think we all feel that there is a great field for investigation. The Hon. Member for Cape Town (Harbour) (Maj. G. B. Van Zyl) also pointed this out in connection with Kirstenbosch, but experiments of this kind do not come under the Department of Public Health. That department was created under the Public Health Act of 1919, and Hon. Members will see that under that Act, nothing of the kind is referred to the department. But the department, of course, attaches importance to it, and I think that Hon. Members have spoken with that in their thoughts. At Kirstenbosch enquiry is made about the economic value of certain plants, but the enquiry into the curative value demands laboratory research, and it does not come under the department, but under the Department of Agriculture. I want, however, to point out that the University of Cape Town has, through Professor Gunn, taken pharmacological tests. The appointments at the laboratory are, however, not such that good tests can be made of the curative value of plants, but in future it will be possible with the better arrangements that will exist, when the new university is completed. . . . . .

With regard to Kirstenbosch, I think the hon. gentleman (Major van Zyl) complained that it does not receive that subsidy on the part of the Government to which it is entitled. I do not think the hon. gentleman's complaint is justified.

The hon. gentleman knows that, personally I have a great deal of sympathy with Kirstenbosch, and I did what I could for that institution. The grants have been more liberal for the last few years than before, and I can tell the hon. gentleman that just a few days ago I received notice from the manager of the committee that Kirstenbosch had been left a legacy of £1,000, and other contributions of £50 had been received. According to the agreement existing between the Government and that institution, the Government contributes on the £ for £ system, so that they will get another £1,050 from the Government.

A Garden of Promise on Table Mountain Side

GLORIOUS old Table Mountain always has a special appeal for its lovers; and is a joy and inspiration in all its aspects to those able to appreciate its various moods and changes. It is a privilege to live below its massy crags, and to try to win back on its lower slopes some of the pristine glory of its native flora, which in many parts is being slowly choked out of existence by foreign interlopers, such as pines, gums, etc. One cannot even except the fine oaks and poplars — beautiful as they are — for in many places, such as the site of Lady Ann Barnard's cottage on the Newlands slope, they have completely blotted out the views spoken of in that gay and witty lady's letters, and overgrown or killed out the native flora under their dense shade.

Having been asked to write something about this garden, situated under Fernwood Gully, I hope my experiences may prove of some little interest to readers of this Journal; sketchy and incomplete though they are. Being nothing of

a qualified botanist, but a great lover and observer of nature, a certain measure of success has been achieved in growing plants from various parts of this country — though only a beginning has as yet been made — in the six years since the garden was begun and planned.

It is of absorbing interest to find the proper aspect and conditions for plants and flowers, from the varied climates of the more temperate parts of Africa. It is useless (out of doors) to attempt to grow many things from the tropical and sub-tropical regions which have a summer rainfall and moist steamy atmosphere. There is such a great variety which can be grown, however, that one can be well satisfied to confine one's efforts to those which will flourish happily in these regions.

Though the indigenous African trees are slow growing it is well worth while cultivating them, and many make quite a show in a few years' time. Even if we will not see them as forest giants in our lifetime, they will be a joy to ourselves now and to others in the future, and for generations to come. The "Umkuhla" (Trichilia emetica), that splendid Natal shade tree, grows into a goodly sight in twenty years here. The Yellowwood (Podocarpus) flourishes even when not in very moist or sheltered conditions; some grown here are ten feet high in less than five years. There are several planted in Rondebosch, thirty years old, which are now very large and beautiful trees. Kaffir Plums, various Ficus trees, Cape Beeech (Beukenhout), Cunonia (Rooi Els). The Cape Chestnut (Calodendron capense) is a fine tree with beautiful blossom. A grand specimen can be seen in full bloom every spring at Groot Constantia. The Stinkwood (Ocotea bullata) grows and that and the Yellowwood were growing of old in the kloofs of Table Mountain: some small specimens are still to be found wild in some remoter gorges. Many others will grow well. Why should we not grow more of them instead of confining our efforts in forestry to exotics? At George the Forest Department is doing something in that direction and some varieties of native trees can be obtained. I should also like to see many of our beautiful flowering shrubs more generally cultivated. Bauhinias, various Gardenias, Dais cotinifolia, Tecoma capensis, Plumbago, Erythrinas (Kaffir boom), Podalyria (Keurtje) covered with sweet-scented pea blossom grows in profusion in this kloof and all along this side of Table Mountain. In Spring they are a mist of delicate pink and grey. Buddleias, Greyia Sutherlandii, Mackaya bella, Pavetta natalensis and many others make a brave show when in blossom, and have nice foliage when not. These could doubtless be improved with cultivation.

In this part of the country where there is little or no frost many delicate subjects will flourish happily, which cannot be grown in colder areas. Could we not have an "Arbor Day" for the schools and in civic gardens or parks, as they do in America? This has done much for tree culture in the country, which was being greatly denuded by forest fires and extensive felling, without replacement. When in 1920 I first began to develop this garden all the slopes were covered with self-sown pine trees, which sour the soil and either kill or arrest the growth of the native flora. A great many of these had to be cut down and the ground deeply dug and enriched to make it possible to grow other things. When the ground was cleared lovely grey mossy rocks were revealed, and since sunlight and air have been given them numbers of wild bulbs, flowers, small shrubs and ferns are springing up, each season in greater profusion. These being added to by many varieties of our own lovely wild flowers from other parts of the country should make a fine and interesting show in time. The slopes being very steep a great deal of terracing has been necessary, whic his a long and costly job, though this method in the end is justified in better results and enhancement of the beauties of the garden. Fortunately the mellow-toned Table Mountain sandstone being on the spot helps the work considerably in building retaining walls. A great amount of water from the Table Mountain catchment areas runs underground in a natural French drain, formed by the boulders and stones which have fallen through countless ages from the scarred sides of the great buttresses above. These stones gradually become covered with soil, mosses and grass, etc., the water percolates, trickles or runs through and under them, here and there showing above ground, and thus revealing its course. In a little kloof on this place is such a small stream, running underground much of its course. Several pools have been dug out and concreted to prevent the water percolating through the earth, dams and barrages made to heighten the stream, over which the overflow makes little waterfalls, each with its own special sound of tinkling watery music. This all greatly enhances the beauty of the spot besides making the water available for use lower down the garden, which otherwise would havee run to waste. In and beside the pools can be grown the water-loving plants such as rushes and water lilies, among them rearing its dainty head the blue African lily (Nymphaea stellata) so fragrant and perfect in shape. On the higher, dry, sunny ground are growing the sun lovers and hardier flowers and shrubs such as many varieties of succulents, Aloes, Mesembrianthemums, Cotyledons, Haworthias, as

well as other drought-resisting shrubs and plants. Aloes generally in this part of the country (with its winter rainfall) are not so happy as in the drier, hotter districts with a summer rainfall, though the kinds from the coast belts and Western Province flourish well, but there will never be the profuse show of bloom that they have in Pretoria or on the Karoo and in the Eastern Province. Many of these succulents are inclined to damp off in a wet winter and need the driest situation, preferably among rocks. There are a great many varieties of Mesembrianthemums, both annuals and perennials, which flourish here — and the blaze of colours in the sunshine of spring and early summer is quite dazzling, a gorgeous, joyous, sight.

As there is such an immense variety of heaths (Ericas) native to South Africa it should be easier to cultivate them, but they are among the most difficult and slowest growing of all subjects and need much care in the earliest stages. One can, however, establish a heath garden in suitable aspects. In Europe, African Ericas are grown to great perfection and bloom more freely than in their native country. As they are so slow growing it is disastrous that there is such wholesale up-rooting and destruction of many rare species where they naturally flourish.

Proteas also can be grown from seed and are hardy when once established. As their tap root is easily injured seedlings must be planted very small. Several varieties grown here are flowering well and begin to bloom about the third year. The exquisite "Blushing Bride" (Serruria Florida) is very difficult to establish and needs special conditions, which all seem favourable at Kirstenbosch, as they are a lovely sight there and flourishing exceedingly just now.

Of course, what really do best of all in this Western Province area are all varieties of native bulbs. Nothing can be more lovely than masses in their various colours of our many Gladiolus, Lachenalias, Watsonias, Sparaxis, Tritonias, Ixias and other species which make such a blaze of glory in the Spring and early Summer. Truly they are a rather evanescent joy, but so well worth growing. As there are varieties flowering through many months of the year one might in time with cultivation have a succession throughout the year of one or another kind.

The more South African part of this garden is kept as natural as possible, only weeds and unsightly plants removed, everything else being left or planted as nearly as can be done on nature's plan and in suitable surroundings.

The more formal garden near the house, as it should appear part of the design of the "Home," has terraced lawns, clipped hedges with formal trees, pergolas, garden seats, a little blue Venetian-tiled pool with an impish baby faun in bronze, being splashed by a water jet. There are flower beds filled with a great variety of cultivated garden annuals, perennials, and flowering shrubs and trees. Under silvery Poplars are blue Hydrangeas, while below and between them the little stream makes cool music on the hottest summer day, the interlacing boughs of the trees giving refreshing shade, their stems reflected in a quiet pool below. In spring and early summer especially this mass of joyous bloom, with the wonderful Mountain as a background and setting, makes a picture which it would be difficult to surpass in any part of the world. A dear little thatched and gabled house presides cheerfully over it all and overlooks a superb stretch of country, thirty miles, to the pearly Hottentots' Holland range, an ever-changing vision of beauty.

As I feel that all true lovers of South African flowers must do everything in their power to save as many as possible of the fast disappearing species, I am making special efforts to grow as many varieties as will flourish in the space available and suitable. With difficult climatic conditions and not too good soil each individual can only do a small amount comparatively, but I feel that if all those interested in other parts of the country would each do what they can with the plants and flowers suitable for their districts, much might be accomplished. It often appears that South Africans themselves are the last to realise the unique beauty and variety of this country's flora. One is often able to get South African plants and bulbs grown in Europe which it is impossible to obtain in this country. We all know that for many years South African plants have been grown and improved in foreign botanical and private gardens. Now in America and Australia great things are being done with the hybridization of our bulbs and other flowers native to this country.

It is only of late years that people in South Africa generally have begun to appreciate and grow their own flowers in preference to ordinary exotics. Now, when that appreciation is really growing the destruction of them through various causes is going on more rapidly than ever; which makes one realize that there is very little time to lose in saving them. The cultivation of the earth to grow food for man's needs is one of the chief destroyers of the lovely flowers of the field.

One could wish that each farm or district would keep out a small wild piece and fill it with the flowers growing in their neighbourhood. These would make preserves interesting to all and add to the joy and beauty of life for many people for years to some. The Karoo Garden (con-

nected with Kirstenbosch) at Whitehill near Matjesfontein is a good example as a beginning on these lines. Africa is *not* an easy country for gardeners, there are so many pests and adverse conditions to contend with, but as nothing worth while is achieved without effort, and one gets more joy out of a garden than most other pleasures or labours it is worth the effort. Anyone that puts unremitting work and love into growing things is bound to achieve some success, giving joy to themselves and many others. It is not the mere spending of money and expecting "the other fellow to do the job" which will make a garden where all might love to linger, or that will bring the peace which passeth understanding. It is the personal touch which counts for so much, and one's real hard work put into it, which shows to a certain extent. A great deal is hidden from other eyes and known only to the planner. Nature is really very kind and usually responds to care, giving back often an hundredfold, even though sometimes she may appear cruel and rather a hard task-mistress. As Kipling's poem of the Garden says:—

"So when your work is finished
You may wash your hands and pray
For the Glory of the Garden that it may not pass away!
And the Glory of the Garden it shall never pass away."

EDITH STRUBEN.

"Luncarty,"
Newlands.

New or Noteworthy Flowering and Foliage Plants at Kirstenbosch.

IN continuing these notes on our native plants it will occasion no surprise if species of the outstanding natural order of evergreen trees and shrubs, Proteaceae, are early brought under review. Although the order is not confined to the Cape, the genus Protea is peculiar to South Africa. The largest number of species are found in Western Cape Province, with others over the remainder, Transvaal, Natal, Rhodesia, and Tropical Africa. Practically all species of the Cape are of the greatest horticultural value by reason of their varied evergreen foliage, handsome terminal heads of flowers and variously coloured bracts. As they extend northwards the attractive colouring and features are lost though their distinctive foliage and flower heads remain. As our "National Emblem" it is particularly appropriate that the distribution of the Protea should extend through all the Provinces. The general outline of bush, foliage and large terminal heads in garden effect are aptly indicated by an enthusiast's cognomen of "The Rhododendrons of South Africa."

Of the many species now established *Protea barbigera*, pl. v. fig. 4, is one of the most charming. A dense foliaged shrub up to 5 feet high, and of six or seven feet spread, it is a note of emphasis as a single specimen, a long line, or in mass. Its large blue-green glaucous leaves with bronze midrib and margin make a solid setting for its bold, woolly and variable coloured flower heads which average five inches long and four wide. Their woolliness is from the white-bearded tips of the involucral bracts; and of the centre, from the side-whiskers of the perianth, at the tip of which the wool is black, and in a young head forms the black centre as shewn in the figure. As the flowers develop this black is lost by its turning brown and the tip being curled under the white wool. The colouring of this wool in the species is constant, the variation in colour being found in the bracts of the involucre which range from sulphur, through pinks, to a deep red. In a batch of seedlings now reaching the flowering stage a fine chartreuse green has flowered and a supposed hybrid with *P. Susannae*. It is a mountain plant, mainly of the western coast region, flowering from the end of July to the beginning of September.

Another species shown in pl. iv. fig. 2, *Protea compacta*, is found over the same area, but generally at a lower altitude. It is a much larger bush, being up to 12 feet in height and made up of longer growing branches with shorter yellowish green leaves in their mature stage. The general and rather irregular habit of growth, leaf colour, and absence of woolliness in the flower makes it very distinct from *P. barbigera*. Its vinous rose heads are slightly toned down with silvery tomentum, and an additional effect is provided by the silvery tone of the leaves of the young growth. It is a strong and healthy grower,

Plate IV. South African Plants Grown at Kirstenbosch.

Fig. 1. Leucospermum reflexum.
Fig. 2. Gazania Pottsii & Dimorphotheca pluvialis var.
Fig. 2. Protea compacta.
Fig. 4. Buddleia salviaefolia & Brachycarpaea varians.

and comes into flower the third year from seed. It is winter flowering, starting in June and usually finishing in August.

The value of another genus of the order is well exemplified in *Leucospermum reflexum*, pl. iv. fig. 1. It is the most gloriously distinct flowering shrub in an order of wonderful plants. Colourful in its blooms, colourful in its foliage, it is unforgetable in a mass or as single blooms. The flowers are also intensely interesting right from the young to the fully developed stage. In the bud stage the two inch style is enclosed in the incurved tubular perianth with the stigma inserted among the anthers contained in the hollow club-shaped perianth tip. The growth of the style, up to three inches, gradually splits the tube from the base upwards, and the two form a miniature archer's bow. Soon the club tip divides or bursts, liberating the pollen and stigma, and the reflex action of the style continues until it lies near to and parallel with the peduncle; at the same time the perianth claw rolls up enclosing the empty anthers. Afterwards a return movement of the styles takes place until the whole forms a creditable helmet-shaped bloom, so that the movement of the flower and style is from incurved to fully reflexed, and half way back to incurved.

The plant is an evergreen erect branched shrub up to ten feet, almost wholly covered with bluish grey tomentum. The leaves are small and decrease gradually to the flowering tip, the whole giving the plant a light upright effect. The flower heads, four inches long and two and a half wide, are terminal and solitary. When young the crimson flowers are toned down by the grey tomentum, but with the exposure of the glabrous styles and inner surface of the perianth tube the colour effect is a rich warm crimson, the top of the style and stigma being yellow. It is localised on the Cedarberg Range.

A second species, *Leucospermum grandiflorum*, is the shrub seen in the left centre of pl. v. fig. 2. It grows to 6 feet, rather sparsely branched, and covered with greyish green foliage. Its colour is in the styles, yellow when young and usually crimson with age. The plant is interesting and useful but much less ornamental than *L. reflexum*. It is native of the Western and South Western Districts, usually at a low altitude; and will withstand, if it does not like, a considerable amount of moisture in winter on a sandy soil.

Another genus of Proteaceae yields an unique flowering shrub in the "Blushing Bride," *Serruria florida*, pl. v. fig. 3. Its rarity, its distinctness from all the above, its charming form of flower, and its dainty pink and white colouring has made it the "Pride of Kirstenbosch," in which position it has remained unchallenged until the advent of *Leucospermum reflexum*. It is also a worthy example of the aims and objects of these gardens, the preservation and cultivation of our wild plants. In its only known locality, French Hoek, rumour has it that it has been exterminated by bush fires. In 1914 four or five seeds were received from Bolus, two plants resulting. From these have originated the present stock which are, and have been, supplying seeds for distribution and — let those holding insular opinions take note — among the receipients are residents of French Hoek. A return of some hundreds per cent in seeds has been given.

The plant is a sparsely erect-branched shrub, lightly veiled with narrow pinnate and bipinnate leaves the dark green of which contrasts with the red and brown stems. If left to itself the plant becomes leggy and bare underneath, but this can be remedied by cutting back as soon as flowering is over — at a sacrifice of the development of the seeds. The period of flowering is from July to October when new growth starts from below the terminal inflorescence. The annual growth varies up to 2 feet which may give up to a dozen solitary heads arising from as many axils of the uppermost leaves, the aggregate being corymbose. The inflorescence consists of numerous peduncle bracts, white tinged yellow below and stained pink at the tip with age, and the central flowerhead. Around the head the larger incurving bracts form an involucre slightly exceeding the head. As the individual flowers open and the ciliate floral bracts develop, a reddish brown and yellow tinge is given to the central fluffy, boss-like head; the ensemble and colouring resulting in the daintiest member of the Proteaceae.

In yet another genus, Leucadendron, quite a distinct and pronounced colour tone is struck. The colour is derived, not from their blooms, but from the vivid yellows and yellow greens of their foliage, and, considerably intensified, in their involucral leaves: colours that strike one as having the greatest visibility of all colours. The genus is dioecious. The male plant of *L. grandiflorum* pl. v. fig. 1, has smaller leaves, more freely branched growth, and makes a larger bush than the female. The male grows to 6 feet high and a little more through, with branches on the ground. It is evergreen, and well furnished with leaves. In contrast to the Leucospermums the leaves increase in size upwards, until the incurved leaves of the involucre in the female are 3 inches long by an inch wide at the base. During July and August the involucre becomes a vivid light yellow with a knob of deep yellow flowers in the centre of the male. With age the involucre becomes a bluey green with crimson brown in the lower half while the flower scales pass through shiny chocolate to nut brown in the dry stage. In the

female plant the cone becomes more prominent with reddish brown scales and growing to two inches long and wide. There is a continuous change in colour effect throughout the active periods of growth, flowering, and seeding.

The cultivation of all the above, with the one exception given, is alike under western conditions. An open situation on a well drained loamy soil is the ideal. Propagation has been so far solely by seeds, usually sown from March to May, the seedlings being carefully planted out about August, or, if carried over to the next winter, about June. A good watering is given after planting, and occasionally afterwards as conditions demand.

There is a surprising difference in the time taken by the various genera to develop ripe seeds. In Leucospermum, Serruria, etc., the seed is mature and falls before the inflorescence has lost all its colour. The outer flowers of the head open first and so on to the centre. The seed follows the same order but only a small percentage of the flowers are productive. The seed of Leucospermum is a shiny slaty white colour about 3 lines long and 2 wide: that of the Serruria a hairy one between 2 and 3 lines long and half that in width. Both can be picked, shaken or lightly brushed from the head with a finger when ripe. I have vivid recollections of my introduction to the seed of *Leucospermum mixtum* in the Wolseley district. After flicking off a few " bugs " from the blooms, breaking up all the dried heads lying about, and searching the ground around, attention was turned to the " bugs " as it had been noticed there was no movement. Examination proved they were good ripe seed. I do not now wonder at the Leucospermum being called " Luisbossie."

The seed of the Leucadendrons is developed in the cone-like heads and *L. grandiflorum* is ripe about January, when the scales open and the large black seeds are visible before they fall.

In the Protea mature seed is not produced under twelve months, so that the old brown flower heads have to be secured to obtain seed. These heads with their seeds may persist on the bush up to 3 or 4 years, unless a bush-fire hastens their dispersal.

Buddleia salviaefolia, pl. iv. fig. 4, centre, is a dense free growing shrub up to 15 feet high. It renews itself by erect basal shoots which ultimately become pendulous from the weight of the lateral flowering branches. Its conformation is globular, and its general colour tone is grey from the heavy tomentum of the closely packed rugose leaves. It flowers freely from June to September and is very sweetly scented. The flowers vary from yellowish white and orange to a good lilac. It is widely distributed in colour varieties from Caledon and Clanwilliam, through the Karoo, Eastern Province, Transvaal, Natal and to the tropics. It is readily increased by division, or from cuttings of old or young wood. It thrives well in any loose soil, and should prove useful as a low shelter belt or informal hedge where not induced to make luxuriant growth. As a single specimen it has a distinct weeping habit, and can be pruned or cut about as you will.

Gazania Pottsii, pl. iv. fig. 3, top, is a new species from the Orange Free State. It has a more tufted habit than *G. pavonia*. Its foliage is glabrous, olive green above, and white with tomentum under, except the midrib. The leaves vary from lanceolate to irregularly obovate, narrowing to a petiole-like base, and only occasionally pinnate. It is perennial and evergreen and invaluable for a dry situation in sand or any open soil. The flowers are yellow, ranging from sulphur to orange, without the peacock eye of *G. pavonia*, and borne on 12-inch stalks well above the foliage. Seedlings are varying much in foliage and flowers. It is outstanding in the period of flowering extending from June into and flowering most freely in the hot dry weather of January and February. It is reproducing itself freely from seed, and colour varieties can be increased from division of the clumps.

Brachycarpaea varians, pl. iv. fig. 4, right front, is the finest, daintiest, most prolific and most prolonged flowering plant extant. Its dominant colouring is the ever appealing lavender, but true to its specific name, it varies up to a light purple and white, with some plants partially sporting to pure white, and white barred flowers. In effect it is a lavender flowered Broom, the plant being made up of practically leafless twigs and long racemes of cruciferous flowers. It grows 3 feet high and 4 feet through, with the older shoots decumbent from the weight of the many younger and more erect flowering shoots. Its life is 5 or 6 years, and in its seedling year produces a few inflorescences, and thereafter its whole energy is expended in producing flowering shoots until in its third year it forms a dense mass of waving flowers, which are at their best from June to December. It revels in a free, well-drained soil without artificial watering, and in an open position. Its only means of increase is by seeds which apparently take a year or two to germinate. So far they have failed to germinate under ordinary nursery conditions. The plants in existence here have come up from self sown seeds, in some cases a hundred yards from the parent plants. All attempts have failed with the usual methods of vegetative propagation. There are only two species in the genus, each with 2 varieties, which are peculiar to South Africa. The second species *B. laxa* has flowers " purplish or yellow;" and a pink variety, not mentioned in the Flora Capensis, comes from the Zwartberg

Mountains. It is 1-1½ feet and a lovely plant for the rockery. Both species are mainly western, occurring in Piquetberg, Cedarberg and the Zwartberg.

In Plate V., Fig. 2, right front, is shewn a new species, *Watsonia Pillansii*, received from Kentani. It has erect narrow light green foliage, and slightly harsh orange coloured flowers, produced freely at some time from June to September, according to the amount of moisture available during the summer. It is one of the evergreen species thriving with abundance of water all the year round, when its flowering period is prolonged, and often recurrent in November. It seeds freely, and can be increased by division immediately after flowering. Replanting should be done at once, as "drying out" or storing weakens the bulbs so much that they will take over a season to again reach flowering strength.

In the Frontispiece, and in Pl. IV, Fig. 3, below, is shewn a variety of *Dimorphotheca pluvialis* having a vivid blue-purple ring round the black disk, the remainder of the ray florets being a pure white on the surface, and cream barred purple under. It flowers from July to the end of September under natural conditions on prepared ground. Sown in March and transplanted 10 to 12 inches apart as soon as large enough to handle it makes an effective and prolonged display. It was obtained from the kopjes around Saldanha Bay, growing in humus among the boulders. It is found in a less attractive form around Hermon, Porterville, etc. It recently received an Award of Merit from the Royal Horticultural Society, London.

J. W. MATHEWS.

Kirstenbosch,
October, 1926.

What's in a Name?

A FEW THOUGHTS ON THE SCIENTIFIC NAMES OF SOUTH AFRICAN PLANTS.

OCCASIONALLY one meets with people who declare that they love flowers, and enjoy looking at various kinds, but cannot see that there is any necessity for all these kinds to have names! One can only infer that such people rarely wish to talk or write about these objects of their admiration. Think how inconvenient it would be if, whenever we wanted to discuss some flower with a friend we had to begin somewhat in this style:—

"Do you remember that pretty blue cup-shaped flower that we saw the day before yesterday, growing in little clusters on a low bush with glossy dark green leaves, in the garden of that new-looking villa in the road turning down the hill just beyond the pine wood?"

More frequently it happens that, though a name is desired, the "long scientific name" is complained of; and the question is asked why a "common English name" cannot be given instead.

A "common" name is not, as a general rule, one that is definitely given to a flower by some particular person on some particular occasion, but a name that has gradually been approved after experiment and use. The kind of name thus attached to a plant depends upon the kind of people who have given the name and made use of it.

Such names as *moeder-kapje*, *pijpies* and *painted ladies* suggest children playing with flowers; while *sterretjes*, *avondbloem*, *flames*, *red-hot-pokers* and *Kafir-crane flowers* seem to indicate the fancies of older people. Other names we feel are due to men working with wood, and more concerned with its use or its quality than with the kind of tree it comes from. Thus we have *waa-boom*, *beukenhout* (or beech-wood) *essenhout*, *stinkwood*, *yellow-wood* and *sneezewood*. Another series of names are given by immigrants to South Africa, from some resemblance, real or fancied, to the flowers of their former home; — such, for example, as *arums*, *mimosa*, *heath*, *Cape honeysuckle*, *Cape violets*, *buttercups*, *boterbloem*, and *tulp*. Names given earlier by Hottentot or Bantu races exist, but are not much known to Europeans. A missionary from Natal or Zululand told me that once, when she had taken her girls for a picinc, they brought her some fifteen different kinds of grass, with a distinctive Zulu name for each kind; and the only English name she could tell them in return was "grass."

Many "common" names are vague, and vary in different parts of the country. For instance the "*wild pomegranate*" we knew, some years, growing about Grahamstown, had a red flower and dark shiny green leaf, — *Burchellia capensis*. But here the name seems to be given to the *Rhigozum obovatum*, which has a yellow flower and small leaf.

In scientific nomenclature something more accurate and distinctive is required, and the names given are often full of interest when their origin and signification are understood. It should always be remembered that true science is international. The European botanists of earlier days,

English, Dutch, German, French, Swiss, or Swedish, wanted to communicate with each other in names and terms that all could understand; hence Greek and Latin, the languages most widely known to scholars, were employed. Even a slight knowledge of these two languages is a great help towards learning and remembering botanical names and technical terms. Scientific names are not given haphazard; they help to show the relationship of plants to one another, their general description, or habitat; or perhaps refer to some peculiar feature in their structure, or to a particular association connected with their discovery.

The first real attempt to put botanical nomenclature on a scientific basis was made by Theophrastus, a Greek philosopher (370 to 286 B.C.) who was the favourite pupil and successor of Aristotle. The most important of his works which have come down to us are two large botanical treatises wherein about five hundred species of plants are described, — chiefly in relation to their medical properties. In the first century A.D. another Greek, an army doctor named Dioscorides, also wrote a book about plants and their medical virtues, calling them by their current names. In the latter part of that century the elder Pliny, who was Admiral of the Roman fleet, and perished in the great eruption of Vesuvius, A.D. 79, that destroyed Pompeii, dealt with the same subject. Out of the thirty-seven books of his "Naturalis Historia" which have been preserved, no less than sixteen treat of trees and plants. He enumerated five hundred species by name, but it is difficult now to identify many of them with any certainty.

After Pliny little more was done for several centuries, except by the Moors of North Africa, whose interest in plants was concerned mainly with their uses in medicine.

After the revival of learning, however, in the fifteenth century, A.D., the works of classical authors were printed and eagerly studied; and among them the writings of Pliny, Dioscorides, and Theophrastus appeared in book form between the years 1468 and 1483. During the sixteenth and seventeenth centuries botanists were at work, in different parts of Europe, classifying plants, studying their nature and culture, and fixing their names. The Dutch were great gardeners, and many South African plants were sent by them to Holland.

With the eighteenth century a new era begins. Linnæus, the famous Swedish botanist, was born in 1707, the son of a poor clergyman. He became an eminent physician, President of the Swedish Academy of Science, and Professor of Botany at Upsala University. His special work in botany was two-fold, — classification and nomenclature. His system of classification was very useful for a time, but proved too artificial, and has been superseded. His work in the department of nomenclature was sound, and in essentials remains a law for botanists to-day.

His main idea was to denote each plant by two names, referring to its genus and species, the first being a substantive, the second an adjective agreeing with the first in gender, or sometimes a substantive used adjectivally. This is called the binomial system. Before the time of Linnæus plants used to be identified by long Latin descriptions. Thus the Dog Rose would be "*Rosa sylvestris vulgaris flore odorato incarnato*" — that is "the common Rose of the woods with a sweet-scented, flesh-coloured flower." Linnæus called it simply *Rosa canina* — that is, Dog Rose.

The vegetation of the world is not naturally divided into distinct compartments, but botanists have classified plants for reasons of convenience in study, and the arrangement of their divisions is to some extent arbitrary, although due consideration is given to natural affinities. A species comprises all the individual plants which possess certain well-marked features in common, and which propagate with each other. A group of species which resemble each other in certain features of a more general nature is termed a genus, and in a similar manner genera are collected into families and orders.

The names of botanical orders are usually taken from one of the leading genera belonging to them; e.g., *Ranunculaceae*, *Geraniaceae*, *Ericaceae*, and *Proteaceae*. Exceptions to this rule, however, are the *Leguminosae*, with the seeds contained in a pod or "legume;" the *Compositae*, (or compound flowers) with small flowers growing in one head surrounded by an involucre; and the Gramineæ, or grain bearers, named from the Latin *gramen* = grass.

Many South African plants belong to orders which already bore names because they had representatives in Europe. Others grow only in the southern hemisphere, and for them new names had to be found. The Dutch colonised South Africa many years before the English began to settle in Australia, hence the majority of names were given first to South African plants, and orders such as *Proteaceae*, *Myrsinaceae*, *Bruniaceae*, *Selaginaceae*, and *Penaeaceae* were named from the leading South African genus in each.

The names of many South African plants were fixed by an edition of the works of Linnæus published in the year 1753. Among the names of genera a certain number were inherited from Europe, but a considerable number of new names had to be selected. Some of these are more or less descriptive, others are called after great

Plate V. South African Plants Grown at Kirstenbosch.

Fig. 1. Leucadendron grandiflorum.
Fig. 2. Leucospermum grandiflorum & Watsonia Pillansii.
Fig. 3. Serruria florida.
Fig. 4. Protea barbigera.

botanists or other personages famous either in real life or in mythology.

New discoveries in science are always of special interest to the scientist, and just as the Antarctic explorer might name his discoveries Victoria Land, Franklin Island, or Mount Erebus, the botanist may show his veneration by the name he gives to a plant. For example the graceful keurboom, with its pale sweet-scented flowers, received from the French botanist Lamarck the name of *Virgilia* in honour of the poet Virgil. Another dainty tree, the *Halleria*, which also grows freely at Kirstenbosch, was named by Linnæus after the Swiss botanist Haller, a contemporary of Lamarck. Anyone who has read W. Burchell's travels in South Africa, or the life of W. H. Harvey must look with added interest at such flowers as *Burchellia capensis* or the *Harveyas*. Our varied *Proteas* are a well-known example of a name taken from mythology, being called after the sea-god Proteus who continually changed his shape. For a descriptive name we may take *mesembrianthemum*, the "mid-day flower," from the Greek *mesembria* which means mid-day, and anthos = flower. *Geranium* is from the old Greek name *geranion* (*geranos* = crane) given to the plant centuries ago because the long beaked seed-vessel was thought to resemble the bill of a crane. The English name is "crane's-bill." Analogous to this we have the South African genus *Pelargonium*, from the Greek *pelargos* = stork. *Gladiolus*, a diminutive from the Latin *gladius* = sword, is so called from the sword-shaped leaves of many of the species.

That long and puzzling name *Dimorphotheca* merely means that the *theka* (which here signifies the achene or seed-like fruit) is di-morphic, or of two forms. In similar manner the *Osteospermum* is so called from the Greek *osteon* = *bone*, and *sperma* = seed, because its seeds are so hard and bony. *Leucadendron* is practically the Greek for witte-boom, the white or shining tree. *Struthiola* with its plumy sprays of little white flowers is perhaps named from the Latin *struthio* = an ostrich.

Among generic names that come from Europe we have Anemone, or wind-flower, from the Greek *anemos* = wind; *Oxalis*, the Greek name for sorrel, so called from its sharp acid taste; *Erica*, from the Greek *ereike* = heath or heather; *Senecio* from the Latin *senex* = old man, on account of the long white-haired pappus; and various others.

The specific names of flowers and trees often describe some botanical feature, *e.g.*, *sericea* = with silky hairs, *gracilis* = slender or graceful, *repens* = creeping, *tenuifolia* = with narrow leaves; or refer to the habitat, *e.g.*, *capensis*, *natalensis*, *maritimum* = growing near the sea, *montana*, a mountain form. Such names are, as was said before, adjectival, and can be used for species in many different genera. Other species are called after people, as for example *Ecklonis*, *Zeyheri*, *Bodkinii*, *Marlothii*, *Dregeana*.

When one thinks of genera like *Erica* with over 460 South African species, *Mesembrianthemum* with nearly 300, *Senecio* with about 180, *Pelargonium*, *Aspalathus* and *Helichrysum* with from 140 to 160 each, and *Oxalis* with over 100, one realises that the finding of suitable specific names is no light task. It is no wonder that botanists unwittingly give new names to plants that have already been named by others, and that the nomenclature has to be revised from time to time. According to botanical etiquette the botanist who first examines and classifies a plant has the right of naming it; but when a list of names is revised it is sometimes discovered that an older name exists than one which has been generally accepted. In this case, unless there is some botanical reason, due possibly to an alteration in classification, the older name has the priority; even though the newer one may be more appropriate or more euphonious. Hence the beautiful red *Disa* of Table Mountain is called *Disa uniflora* because this name was given by Bergius, the first botanist to describe and publish it under the Linnæan binomial system, in 1767. Probably he had one-flowered specimens to work from, but there are often two or three flowers on a stalk, so that the name given at a later date by the younger Linnæus, *Disa grandiflora* seems more appropriate, and has been long and widely known. It may be of interest to note that the first mention hitherto discovered of this plant is in the "Historia Plantarum" of John Ray, published in 1704, where it is enumerated as "Orchis Africana flore singulari herbaceo." The white arum which grows so freely in many parts of the Cape, especially near the coast, has been called at various times *Calla aethiopica*, *Richardia africana*, and *Zantedeschia aethiopica*. Among the Cycads at Kirstenbosch several from the district of Albany belong to the genus *Encephalartos*. In old days we knew these "Kafir Bread trees," growing in the Kowie bush, as *Zamias*, from the name given by Thunberg either to that genus or to a nearly allied one.

The thorn trees of the central and eastern districts of the Cape, whose golden balls of flower so sweetly scent the air in summer, are commonly called Mimosas. But though they belong to the sub-order *Mimoseae* they are of the genus *Acacia;* and their correct name, which was at one time *A. horrida*, on account of the large thorns, is now *Acacia karroo*, because it was discovered that the former name had previously been given to an Indian plant. *Aka-*

kia was the Greek name for some plant of this genus, probably a thorny acacia which grew in Egypt. The word seems to be connected with *ake* = a point.

Many names, both generic and specific, are made up with the help of Greek and Latin words, such as *chrysos*, gold; *helios*, sun; *poly*, much; *phileo*, to love; *anthos*, flower; *phyllon*, leaf; *kephale*, head; *pteron*, wing or feather; *melas*, black; *kalos*, beautiful; *aureus*, golden; *argenteus*, silver; *multi*, many; *flora*, flower; *folium*, leaf; *fero*, to bear or carry; *latus*, broad; *parvus*, small; *niger*, black; *barbatus*, bearded; and *cornutus*, horned.

Having briefly considered the general principles of botanical nomenclature, we may now give our attention to some examples from the better known South African flora. *Nymphaea stellata*, commonly called the blue water-lily, or blue lotus, derives its generic name from the Greek water nymphs, while *stellata* alludes to its starry shape.

Among the *Cruciferae* the largest South African genus is the *Heliophila*, or lover of the sun, with delicate fugacious flowers. *Polygala* (much milk) is the name of the little English milk-wort, which has a white milky juice. Here we have many examples of the genus, including *P. myrtifolia*, a large shrub with handsome purple flowers, and *P. Garcini* a small and slender shrublet which is common in the Cape Peninsula and the south-west. Another member of the *Polygalaceae* is *Mundtia spinosa*, a spreading plant with spiny thorns, which grows freely on sand-dunes round the coast, and bears red berries appreciated by birds and children. It is called after Leopold Mund (or Mundt), a young pharmacist and botanical student who was sent to South Africa from Berlin about the year 1816.

Among the *Rutaceae* one of the most striking is the *Calodendron capense* (the beautiful tree) often called the "Cape chestnut" which grows chiefly in the Eastern Province. Various species of "Buchu" also belong to the sub-order Diosmeae, and among generic names are Diosma (divine smell), Barosma (heavy smell) and Agathosma (good smell).

Phylica is apparently so called from the Greek *phulike*, an evergreen tree, a kind of Rhamnus. Growing among bush on the Cape Peninsula *P. capitata* and *P. plumosa* are conspicuous for the pale yellow feathery bracts which surround the heads of tiny flowers. There are over 50 species of *Phylica* in South Africa.

The Order of the *Leguminosae* is a very large one and includes many beautiful flowers. Over eighty genera are represented in South Africa, containing among them large trees, shrubs, and small herbaceous plants. *Podalyria* was named by Lamarck after Podaleirius, a skilful physician in the Greek camp at Troy. The beautiful sweet-scented "keurtje," *P. calyptrata* (Gk. *kaluptra* = a covering or veil) has bracts in the form of a little cap which covers the bud, and falls off as the petals unfold. *P. sericea* with smaller flowers, is a pretty silvery-looking bush; leaves, branches and pods are all covered with soft silky hairs. *Crotolaria* is from *krotalon*, a castanet, because the seeds rattle in the inflated pods when shaken. *Liparia*, with bright yellow or orange flowers in terminal heads, is from *liparos* = brilliant. *Priestleya*, *Walpersia*, *Rafnia*, *Lebeckia*, *Viborgia*, *Bauhinia*, *Lessertia*, *Borbonia* and *Sutherlandia* are named after botanists or patrons of botany. *Aspalathus*, called after the island of Aspalathe on the coast of Lycia, is said by legend to have furnished the rods with which evil-doers were chastised in Hades. From *A. corymbosa*, which grows on the Cedarberg, rooibos tee is made. The genus *Indigofera* is a large one, and from several Indian species the valuable vegetable dye Indigo, known to the ancients as *Indicum*, is obtained by fermentation from the foliage; hence the name which means "indigo bearing."

Among representatives of the *Rosaceae* in South Africa, the leading genus is *Cliffortia*, which is almost endemic. It has about 50 species, mostly south-western; many of them grow freely on or near Table Mountain, where the pollination of C. *ruscifolia* (whose leaves resemble those of *Ruscus* or Butcher's broom) has raised an interesting problem. The genus is named after Dr. George Clifford of Amsterdam, an enthusiastic cultivator of plants and a friend and patron of Linnæus.

The *Crassulaceae* are so called from their fat, fleshy leaves, the generic name being a diminutive of *crassus*, thick. The flower popularly known as the "Scarlet Crassula" belongs really to the genus *Rochea*, named after François de la Roche, a French botanist. It grows frequently in rocky places, and is one of the brightest and most showy flowers of the country. Its correct name is *Rochea coccinea;* from the Latin *coccineus*, scarlet.

The genus *Mesembrianthemum*, already alluded to, has so many species that it is difficult to know which to single out. One of the largest, *M. acinaciforme* with handsom bright purplish-pink flowers, grows freely over sand-dunes and is named from its "sabre-shaped" leaves. *M. edule* has large pale yellow or purplish flowers and bears an eatable fruit, called sometimes "Hottentot figs" or "gaukums." Mesembrianthemums are known generally as "vijgies" or little figs. *M. criniflorum* (Lat. *crinis* = the hair, or perhaps lily-flowered) an annual, with daisy-

like flowers of varying combinations of white, cream, pink, bright rose, and dark red was very gay in some of the beds at Kirstenbosch last year. Another series, of very different appearance so far as their leaves are concerned, *M. Hookeri*, *M. Bolusii*, *M. simulans*, *M. calcareum*, and others, simulate the appearance of the ground and the pebbles where they grow, and afford a striking example of protective mimicry in plants.

Let us pass on to the great natural Order of the *Compositae*. The pretty little blue daisy *Charieis heterophylla* gets its name from the Greek *charieis*, elegant, while the specific name signifies that its leaves are of different forms. *Aster* means a star; *Pteronia* is from *pteron*, a wing. The name of *Chrysocoma Coma-aurea* whose bright yellow globose flower-heads are common in the western districts, may be translated the " golden-haired Goldenhair." *Cotula* is from *kotule*, a cup, in allusion to the shape of the involucre; and *Athanasia* from *a* (negative), and *thanatos*, death, because the flower-heads are dry and persistent. *Helichrysum* is sun-gold, and *Helipterum* is an abbreviation for a *Helichrysum* with plumed pappus. *Gnaphalium* is from *gnaphalon*, soft down, or wool, on account of its woolly foliage; and *Metalasia* from *meta*, on the other side, and *lasios* hairy, also in allusion to the leaves. *Phoenocoma* means shining hair; *P. prolifera* is a handsome rosy " everlasting " growing freely near Caledon and Hermanus. Among other representatives of the vast cosmopolitan genus *Senecio* we have the annual *S. elegans* of which a particularly elegant variety with yellow centre and pinkish purple rays grows among the sandhills at Muizenberg and elsewhere; *S. Burchellii* which is common on the flats and hill-sides near Cape Town and has a small bright yellow flower; *S. juniperinus*, an inhabitant of the Eastern Province, which rather resembles the English ragwort in general appearance, and like it grows socially in great golden patches; and *S. rigidus*, a handsome shrub with large rough leaves and much-branched corymbs of yellow flowers. *Euryops*, = large eyed, has obtained its name from the conspicuous flower-heads of many of its species. Passing on to the Gousblome, *Gazania* is said to be from *gaza*, a Persian word used by the Greeks to express treasure or riches; and *Arctotis* is from *arktos*, a bear, and *ous*, *otos*, an ear, because the scales of the pappus look little ears (or it is perhaps the upper membranous scales of the involucre that do so?).

Among the *Campanulaceae* the genus *Lobelia* is named after Matthew Lobel, a Belgian physician, who died in London in 1616; *Lightfootia* after the Rev. J. Lightfoot, author of the first Flora Scotica; *Wahlenbergia* after a professor of botany at Upsala; and *Roella* in honour of W. Roell, professor of anatomy in the academy of Amsterdam.

The species of *Erica* are so numerous, and many of them are so local, that it is difficult to pick out anything very distinctive among their names.

Many members of the *Proteaceae* may be studied in the Protea garden at Kirstenbosch. The grey-leaved Waaboom, *P. grandiflora* grows above near the Contour path in its natural habitat. The creamy flower, though handsome, is neither so large nor so showy as some of the other species, *e.g.*, *P. barbata* (bearded), and *P. cynaroides*, which has the largest flower-head of all, with involucral bracts that are a delicate mixture of silver and rosy pink. It is a little disappointing to be told that *cynaroides* only means like a *Cynarus* or globe-artichoke. The " sugar-bush " is called *P. mellifera*, the honey-bearing. The silver-tree *Leucadendron argenteum* grows freely on Silver-tree ridge. Among other species *L. grandiflorum* is a very attractive bush with a peculiarly decorative blending of blues, greens, reds, and yellows in both flowers and leaves. The yellow-leaved *L. adscendens* and *L. salignum* often grow in golden patches on flats and on mountain slopes.

Turning to the orchids, the *Satyrium* gets it name from the two little horns or spurs which were thought to resemble the horns of the Greek satyrs. The large pink one is called *S. carneum*, or flesh-coloured, and the bright orange one of similar growth is *S. coriifolium*, from its leathery leaves. Where the name *Disa* came from does not appear to be known. Among the species of this attractive genus we have *D. longicornu*, the lilac " drip Disa," with a long horn or spur; and the bright blue *D. graminifolia*, named from its grass-like leaves, but at one time called *Herschelia coelestis* in allusion to its heavenly blue flowers. This latter is now placed in the sub-genus *Herschelia*, which includes *D. purpurascens*, of slightly different structure, and of a darker and purpler blue; and *D. barbata* whose quaint flowers remind one of the heads of little gnomes with long beards and peaked caps. The curious-looking genus *Corycium* is named from *korukos*, a leather sack; and *Pterygodium* is from *pterugodes*, wing-like.

The *Iridaceae* take their name from the genus *Iris* called after the rainbow, Iris, messenger of the old Greek gods, because all colours are represented in its blossoms. *Babiana* comes from " baviaantjes," the little bulbs that baboons like to scrat out of the ground and eat. *Ixa* is from the old Greek name of a plant mentioned by Theophrastus. *Moraea* was named by Linnæus after his wife, the daughter of Joh. Moraeus, a Swedish physician. *Hesperantha* whose flowers are sweet-scented at night, means evening flower. *Watsonia* was named after Sir Wm. Watson who died in London in 1787.

The subject is by no means exhausted, but only a few more names can now be given. *Amaryllis* was the pastoral sweetheart sung by Virgil and Theocritus, and *belladonna* means beautiful lady. *Crinum* is from the Greek *krinon*, a lily; the word used in "Consider the lilies, how they grow." *Nerine* is from the name of a sea-nymph, and its name has a curious history. In 1680 a ship coming from the Cape was wrecked on the shores of Guernsey, and from amongst its cargo a number of bulbs were washed up by the waves. These were cultivated and flourished, and were given the name *Nerine sarniensis*, from their watery origin, and from the ancient name of the Channel Islands. In English gardens they are commonly known as "Guernsey lilies."

Agapanthus (from *agapao*) is the loved, or pleasing, flower; and *Haemanthus* the blood-red one. *Aloe* is the old Greek name for the plant, allied to the Hebrew word "allal", bitter. *Urginea* is named after the tribe Beni Urgin in Algeria.

We find therefore that the scientific nomenclature of plants is drawn from many different sources; and that, in some cases at least, the question "What's in a name?" is a question that deserves an answer.

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Some Recent Publications.

CLASSIFICATION OF PLANTS.

I. *Hutchinson, J.* The Families of Flowering Plants. I. Dicotyledons. London. MacMillan & Co. 1926. **20/0.**

II. *Rendle, A. B.* The Classification of Flowering Plants. II. Dicotyledons. Cambridge University Press. 1925. **30/0.**

It has been said that the aim of all science is classification. Whether this is accepted or not, the subject is one that must always be of primary interest to the biologist.

Systems of classification of the flowering plants have been formed in greater or less completeness for many centuries and have passed through many phases. The earlier attempts were concerned as much with the properties of plants and their value to man as with the characters of the plants themselves. Another phase, which followed the stimulus of the work of Linnæus, well named the father of modern botany, was one in which plants were grouped in accordance with certain arbitrarily chosen characters. These artificial systems, as they are called, were often extremely simple in so far as identification was concerned but even in the first half of the 19th century were not regarded as wholly satisfactory. When in the middle of the century the work of Darwin appeared and the theory of descent became gradually accepted, a new stimulus was given to classification and it came to be realised that a system to be of value had to be "natural," that is, it must express the real affinity of the plants and their relationships to one another.

Unfortunately for systematic botany the propounding of the theory of descent coincided with a series of profound and epoch-making discoveries in physiological and morphological botany, and in the desire to throw off the shackles of the old formal studies, these latter sides were taken up almost or often quite to the exclusion of the systematic side. Nowhere was this change of atmosphere more pronounced than in England so that the almost simultaneous appearance of these two volumes, emanating as they do from the two great English herbaria, Kew and the British Museum, marks an epoch that one hopes is a symptom of a return to a broader attitude where classification will hold its right place.

During the last fifty years or so many systems of classification have been put forward but of these only two have really stood the test of time and have had any influence on botanical thought. Of these the older is that of Bentham and Hooker which has been much adopted in Britain. The other, that of Engler, was produced at the beginning of the century and has been steadily gaining ground often at the expense of the older system.

The system of Bentham and Hooker was admittedly incomplete from an evolutionary point of view: the dicotyledons were divided into three groups, *Polypetalae*, *Gamopetalae* and *Apetalae*. The last group was recognised as a heterogeneous assemblage of forms of varied affinity, but at the time so many were of such doubtful position that the group was retained. The great German system of Engler was avowedly a phylogenetic system and marked an immense advance on any previous arrangement. One of the points of fundamental difference between the two systems lay in the starting point: what is to be regarded as the most primitive type of flower? Are we to regard as the most primitive, on the one hand, the flower with numerous separate parts, often arranged spirally and showing gradual transitions from one to another, or on the other hand, the flower of extremely simple structure with no perianth and indeed little except the essential reproductive organs? Bentham and Hooker favoured the former which are represented by such forms as *Magnolia* and *Ranunculaceae*,

while Engler took the latter and placed the catkin-bearing trees at the commencement of his arrangement. The evidence available in support of either view is almost wholly of a comparative nature: the fossil record scarcely helps at all and at present we know nothing definite as to what may have been the ancestor of the flowering plants.

The two volumes considered at present deal with the Dicotyledons alone. Dr. Rendle's book is the second volume of a work of which the first, dealing with Gymnosperms and Monocotyledons, appeared more than twenty years ago, while Mr. Hutchinson promises a second volume on Monocotyledons in the future.

I. Of the two, Mr. Hutchinson's work is much more ambitious and revolutionary, embodying as it does the author's phylogenetic system of classification which is in many ways quite original. The book opens with a short account of the essential features of the earlier systems of classification and of the chief features on which that adopted is based. It is pointed out that in arranging plants in a phylogenetic scheme the points of resemblance are those to be emphasised rather than the points of difference.

The scheme of arrangement agrees with that of Bentham and Hooker, to whom the book is dedicated, in treating the *Magnoliaceae* and *Ranunculaceae* as the starting point. Those flowers with very simple structure without perianth are treated as having arisen by reduction. But beyond this point the scheme diverges very much from that of Bentham and Hooker. The families are arranged in much smaller groups, or orders. In the classification a good deal of stress is laid on the difference between woody and herbaceous plants and the orders are arranged in two series, those of prevailingly woody plants and those of prevailingly herbaceous. This is interesting as being almost a return to the scheme put forward by Ray in the 17th century. The author however admits that this division is not to be taken too rigidly and that herbaceous types may have arisen many times from woody ones. It comes as rather a surprise however to a South African to find such families as *Proteaceae* and *Thymelaeaceae* treated as among the herbaceous forms.

A "tree" is given in which the orders are arranged along these two divisions and their relationships indicated. Beyond some notes on general relationships in the synopsis at the beginning no clue is given of the author's reasons for his groupings or for the changes he makes. This is a drawback which one hopes will be removed in the larger work which is promised in the preface. The reader gets the impression at many points that the groupings are the outcome of an instinctive feeling for relationship of the natural systematist rather than that they are based on a detailed study of facts. This is further evidenced by the fact that several orders are regarded as having had their origin in more than one source.

Each order and family is briefly described and the chief genera named along with the general distribution and some of the useful products. An illustration is given of every family mostly from original drawings by the author or Mr. Trevithick. These are for the most part bold and clear though in many cases somewhat unusual plants have been chosen for illustration. Several maps illustrating the distribution of genera or families are given. It is worthy of note that not one single floral diagram or floral formula occurs.

To render the book of wider appeal and value a key is given by means of which any plant can be referred to its family. This, together with the full glossary of the necessary technical terms should make the book of value to all gardeners, horticulturists and flower-lovers.

A word must be said of the dedication page which is surrounded by what may be called a 'floral border.' The border represents flowers of the families in the two phylogenetic lines, woody and herbaceous.

Mr. Hutchinson's book is certainly one which should be studied by all interested in systematic botany and though few probably will at present be prepared to accept the scheme as a whole, there is in it very much that is both sound and of great value.

II. Dr. Rendle's book is much less revolutionary in ideas of classification. Indeed the whole subject matter is treated from rather a different standpoint. The classification adopted is stated not to be strictly phylogenetic. Three divisions are recognised which represent grades of floral structure: namely, forms with simple or no perianth, polypetalous and sympetalous forms.

Within these divisions the classification on the whole follows the system of Engler. The catkin trees are taken first. Among the polypetalous forms certain alterations are made: some of the larger orders in Engler's system are divided up and some rearrangements are made. The most notable is the position of the *Polygalaceae* which is removed from the *Geraniales* and placed as a family of doubtful affinity after the *Sapindales*.

In the descriptions of the families much more detail is given. Besides the distinguishing floral characters many other features, morphological, structural and other, are discussed and in the case of the larger families the subdivisions are given with their characters. Distribution and useful products are also treated shortly. Some discussion is also given on questions of origin and affinity especially where the classification diverges from the accepted one.

Dr. Rendle omits many of the smaller families altogether and lays special stress on those that have representatives in Britain. This is unfortunate for the botanist who is not resident in Britain: a South African looks in vain for example, for any mention of *Bruniaceae* or *Penaeaceae*.

The volume is well illustrated. While many of the small families have no figures, several are given for the larger ones. The figures show details of structure rather than general form. Many floral diagrams adorn this work.

Dr. Rendle's book will form a most valuable addition to the literature of systematic botany in the English language and should prove of very great value to botanical students.

R. S. A.

SOUTH AFRICAN FLORA.

Burtt-Davy, J. "A Manual of the Flowering Plants and Ferns of the Transvaal with Swaziland." Part I. Pteridophyta to Bombacaceae. London. Longmans, Green & Co. 1926. **15/0**

Dr Burtt-Davy is sincerely to be congratulated and thanked for the work embodied in this book, and for the publication itself. It has involved him in constant labour for five years, which has in both senses been a labour of love, and it is to be feared in considerable expense in actual production. That an author should be heavily penalised for producing a work of real and permanent value, while others are rewarded as heavily for utter rubbish is one of the injustices which science has learnt to accept with a sort of cheerful cynicism as a typical phenomenon exhibited by a madly irrational world. The results in the present instance are that the format of the book is unimposing, the paper is thin and of poor quality, and the type though admirably clear is too small and condensed for comfort. Moreover, every possible abbreviation and economy has been exercised in the text. Such a paragraph as this, taken at random:—

"Lf.-lobes lin.-lanc., entire or with a few acute teeth: frt. sub-globose obtuse or apiculate 1.2—2 cm. l., X ab. 1.2—1.5 cm. diam.: recept. 12 cm. longitudinally 10—striate: pet. 4—8 mm.: pedunc. solitary or in pairs, filiform, 1—fld. 0.5—1 cm. l.: brcts., petiole and pedunc. glab."

reminds one of the k.p.b., h. & c. small-advertiser of the newspapers.

The amount of information packed into the book is indeed amazing, and one must be impressed by the author's industry and care. There was a crying necessity for a book of this kind, which is the first true flora of the northern parts of the Union. The Flora Capensis, especially in the early volumes, is less satisfactory in connection with the Transvaal plants than with those of the Cape Province and Natal: and at the date of publication of the first three volumes (1859-1865) the Transvaal was botanically almost unvisited. Dr. Burtt-Davy's book will largely supplant the Flora Capensis as a work of primary reference for that area. It is not only a work for the collector who desires to get names for his plants: it is an invaluable companion for the systematic research-worker, owing to the fullness of its documentation, the large number of specimens cited, and the details given of distribution within the area and outside.

The descriptions of the plants, families, genera and species, are given in the form of analytical keys, a method that has many advantages: the diagnostic characters appear to be well contrasted, and at the same time allow for the natural variation in dimensions, etc., which is of such importance in discriminating between species and which is so often omitted in brief keys. Experience will show how the flora "works," but it promises extremely well. The primary classification follows that of Mr. J. Hutchinson, whose book on the subject is reviewed on another page.

A considerable number of new species and varieties are published in the Flora for the first time: this is rather unfortunate as they increase the size of the book and interfere with its sequence. A better plan would have been to publish the novelties separately in a periodical, especially as the descriptions have to be repeated in the main text in any case. Notes are given on points of economic and other interest, and these are of special value owing to the author's former closer connection with S. African agriculture. A few illustrations (by Mrs. Burtt-Davy and Mr. Trevithick) are included.

The work is to be completed in four parts, the price of each being the same.

R. H. C.

R. Marloth. "The Flora of South Africa." Vol. II: Section I. Cape Town: Darter Bros. & Co. 1925.

The gap between the Ist and IVth volumes of Dr. Marloth's "Flora of South Africa" has now been partly filled by the recent publication of the first section of Volume II. It is eleven years since Volume IV. appeared, the delay being largely due to factors resulting from the war; but it is to be hoped that the work will now be brought to completion without further misfortunes and hindrances. The new section exactly follows the line of its predecessors, and includes 25 families of Dicotyledons, of which the most important are the Crassulaceae, Leguminosae, Geraniaceae and Rutaceae. The text abounds in valuable matter and original observations from the author's unrivalled experience as a field botanist. The illustrations are on the same lavish scale as before, there being 42 plates in the Section of which more than half are from colour drawings, the rest being from photographs. There are also a large number of text-figures from drawings and photographs. The work does not aim at completeness, as far as species are concerned, but gives a representative selection of those of special interest from the point of view of beauty, abundance, biological features or economic importance. It is a monument to the vast knowledge of the author as well as to the riches of the flora itself.

R. H. C.

PLANT PHYSIOLOGY.

Keeble, Sir Frederick. "Life of Plants." Oxford University Press. 1926. **5/0.**

This book is one of the Clarendon Science Series of small and very moderately priced books, and can be recommended as an eminently readable account of plant life from the standpoint of function. The author studies the plant as a living, working, responsive organism, as astonishing in its powers and habits as the perhaps more spectacular animal. The text is enriched by numerous excellent illustrations and by a wealth of simile and metaphor which is both apt and exhilarating. Printing and binding are as attractive as the matter. Though hardly a school university text-book, this new work from the pen of the Professor of Botany in the University of Oxford should make a wide appeal to students and teachers.

R. H. C.

The Botanical Society of South Africa.

CONSTITUTION.

Name:—

1. The Society shall be called "The Botanical Society of South Africa.

Objects:—

2. The objects of the Society are:—

(a) To encourage the inhabitants of South Africa to take an active part in the progress and development of the National Botanic Gardens at Kirstenbosch, a part of the Groot Schuur Estate in the Cape Province, and to induce them to appreciate their responsibilities therein.

(b) To augment the Government grants towards developing, improving and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch.

(c) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South- African flora.

(d) To enlighten and instruct the members on botanical subjects by means of meetings, lectures, conferences, and by the distribution of literature.

Membership:—

3. The Society shall consist of persons who have signified their assent to be members thereof and who have paid the required subscription.

Subscribers:—

4. There shall be five classes of members:

(a) Honorary Members.

(b) Life Members subscribing not less than £25.

(c) Family Members subscribing not less than £2 2s. 0d. per annum.

(d) Members subscribing not less than £1 1s. 0d. per annum.

(e) Associate Members subscribing not less than 5/0 per annum.

Associate Members shall enjoy the privileges of membership, but shall not vote at any of the meetings of the Society. Honorary Members may be elected at a meeting of the Society on the nomination of the Council.

5. The organisation shall consist of a President, not more than three Vice-Presidents and a Council consisting of 20 members, all of whom shall be chosen annually at the Annual General Meeting of the Society. The President and Vice-Presidents shall be *ex officio* members of the Council.

Any member of the Council resident more than 100 miles from Cape Town shall have the right to appoint an alternate (who must be a member of the Society) to represent him at any meeting of the Council at which he is unable to be present.

6. The Council shall have full control of all the affairs of the Society, and shall have power to appoint a representative or representatives of the Society, as may be required, to act with representatives of the Government and such other bodies as may be agreed upon, as Trustees of the Kirstenbosch Botanic Gardens; and to frame such rules and regulations as may be thought to be fit for the conduct of the business of the Society. Such rules and regulations shall not come into force until approved by a General Meeting of the Society.

Meetings of the Council:—

7. The Council shall meet in Cape Town at least once a quarter. Quarterly meetings shall be held in the first week of March, June, September and December, or at such other times as the Council may decide. One week's notice of all meetings with agenda of the business to be discussed shall be given to each member of the Council.

Quorum:—

8. Three members shall form a quorum at any meeting of the Council.

Funds:—

9. The Council shall have sole power to deal with all funds payable to the Society, but at the commencement of each financial year shall make a fair estimate of what sum will be required to carry on the work of the Society, and fairly and fully carry out all its objects, and shall grant the remainder to the Trustees of the Gardens for advancing the objects for which the gardens at Kirstenbosch are established.

All subscriptions from life members shall be invested and only the annual income from the same shall be paid into the General Fund, until such time as the capital sum may be required for some permanent improvement at Kirstenbosch when the Council shall have the power to pay over the capital sum to the Trustees; provided that a majority of members of the whole Council shall have agreed thereto at a meeting duly called.

Annual General Meeting:—

10. The Annual General Meeting of the Society shall be held in March of each year at such time and place as the Council may determine after giving to members fourteen days' notice and a copy of the agenda.

Business at Annual General Meetings shall be:—

(a) Annual Report of the Council.

(b) Financial Statement.

(c) Election of President, Vice-Presidents and Council of Representatives.

(d) Consideration of notices of motion (such notices shall be submitted to the Council three weeks prior to the date of the Annual General Meeting).

(e) No other business than that on the agenda shall be transacted.

Any member, however, after the transaction of the business on the agenda may, with the permission of the chair, bring forward any matter for discussion without previous notice being given.

11. The quorum of all General Meetings, special or otherwise, shall be 10.

If a quorum be not present the meeting shall stand adjourned until such time and place as the Council may determine.

The President for the time being, or in his absence one of the Vice-Presidents, shall preside at any General Meeting and if the President and Vice-Presidents be absent the meeting shall elect one of the members to be Chairman.

Special General Meeting:—

12. A Special General Meeting of members may at any time be called by the Council, and shall be called at such time as the Council may decide on the receipt of a requisition to the Council signed by at least 20 members. Such requisition shall state specially the reason for such meeting and the matters to be discussed. If no quorum be present the matter shall drop.

No other business than that for which the special meeting is called shall be transacted.

Change in Constitution.

13. The constitution shall in no way be varied, altered or annulled, except by a two-thirds majority of the members present and voting at an Annual General Meeting or at any Special General Meeting called for the purpose and in either case one month's notice of a motion so to vary, alter or annul the constitution shall be given.

RULES.

1. The financial year of the Society shall be from the 1st January to 31st December.

2. Members' subscriptions are due and payable on the 1st January in each year, and must be paid by the 30th September, provided that new members joining the Society after September 30th in any year, and having paid their subscriptions will not be liable for any further subscriptions until the end of the following year.

2. Any member who wishes to resign from the Society must give notice of his intention to do so on or before the 31st December in any year.

4. The Council shall have the power to refuse or cancel membership. In case of membership being cancelled the member in question shall have the right to appeal to the whole Council.

5. The Council shall elect from amongst their number a Chairman, Vice-Chairman, and Honorary Treasurer and shall have power to appoint sub-committees for any special object and to delegate to such sub-committee the functions and powers of the Council relating thereto.

6. Any member of the Council absenting himself from the Council for four consecutive meetings without leave shall vacate his seat. The Council may grant leave of absence to any of the members of the Council for such period as such Council may deem fit.

7. In the event of any vacancies occurring on the Council after the annual appointment by the Society the Council shall have the power of filling such vacancy.

8. One or more auditors shall be elected annually, at the Annual General Meeting, or at such other meetings as may be called specially for the purpose, who shall examine the books and accounts of the Society and report thereon annually. Should no auditor be elected or should any vacancy occur, the Council may nominate the auditor or fill any vacancy.

9. There shall be at least two ordinary meetings of the Society in each year for the reading and discussion of papers and other communications on subjects of botanical and horticultural interest in each year. At least one of these shall be held at Kirstenbosch.

10. No addition or alteration shall be made in the rules of the Society except by resolution at a General Meeting, and after not less than one month's notice thereof of such addition or alteration.

ANNUAL REPORT, 1925.

The Council has pleasure in submitting the Thirteenth Annual Report of the Society.

MEMBERSHIP.—The membership of the Society stands at: Life Members, 62; Family Members, 58; Members, 462; Associates, 330; total 912.

ANNUAL GATHERING.—The Annual Gathering at the National Botanic Gardens was held on Saturday, October 10th, and was attended by a large number of Members. The meeting was addressed by the Rt. Hon. Sir James Rose-Innes, the President of the Society, Sir Lionel Phillips, and Professor Adamson, who spoke of the progress of the Gardens in the absence of the Director on leave.

GENERAL MEETING.—At the Annual General Meeting, held on March 31st, the following officers were elected for the year:—

President: The Right Hon. Sir James Rose-Innes, P.C., K.C.M.G.

Vice-Presidents: Sir Lionel Phillips, Bart., Hon. Sir Lewis Michell, C.V.O., Sir Max Michaelis.

Members of Council.—Sir Drummond Chaplin, Professor Adamson, Professor Compton, Mr. W. Duncan Baxter, Mr. W. A. Eaton, Mrs. F. Bolus, Miss Fairbridge, Mrs. Carter, C.B.E., Dr. Lilian Robinson, Mr. P. Stuart Horne, Dr. Bennie Hewat, Mr. F. E. Cartwright, Mr. H. T. Twentyman Jones, Mr. W. de N. Lucas, Mr. H. C. Starke, Miss E. Struben, Miss F. M. White, Mrs. H. S. Van Zijl, Major G. B. Van Zyl and Mr. R. J. Kingston Russell

COUNCIL MEETINGS.—Four meetings of the Council were held during the year.

At the first meeting of the Council Sir Drummond Chaplin was re-elected Chairman, Mr. Eaton Vice-Chairman, Mr. Twentyman Jones Hon. Treaesurer, Mrs. Bolus Hon. Secretary with Mr. Cartwright Acting Hon. Secretary.

JOURNAL.—The eleventh volume of the Journal of the Society was published in June. The various instructive articles which appeared were very much appreciated by members. Several expressions of thanks were received from various parts of the world and from many of the leading Botanic Gardens. The thanks of the Society are due to Professor Compton for having undertaken the arduous duties of Editor.

THE PEARSON MEMORIAL HOSTEL was formerly opened for student residents of the Gardens on September 1st, 1925, and under the able guidance of Mrs. Stow has proved of very great value to the Gardens and to the comfort of the lady gardeners. The number of students in residence varies, but it is gratifying to notify that with the addition of a few Members of the Herbarium staff, the Hostel is able to pay its way.

THE TEA HOUSE still continues to perform a useful function in the Gardens, and the affairs are ably conducted by Mrs. Key, the lessee.

VACATION COURSES.—One Vacation Course was conducted in the Gardens by Miss Starke in September, and was attended by 10 students and teachers, six of whom were resident at the Pearson Memorial Hostel.

FINANCIAL.—The audited financial statement accompanies this Report, and from which will be gathered that the sum of £564 18s. 10d. has been available for the purpose of augmenting the funds of the National Botanic Gardens. This compares very satisfactorily with the amount available last year, which was £402 17s. 4d.

APPEAL FOR NEW MEMBERS.—It must be constantly borne in mind that the only means which this Society has of benefiting the Botanic Gardens is by augmenting the Membership Roll and thus increasing the yearly grant. Although it is gratifying to be able to report a fairly substantial increase in Membership, it is still necessary to emphasise that the Gardens are still in urgent need of funds for development, and particularly maintenance of those parts which have undergone cultivation. Members are urgently requested to interest their friends in the work and to point out the privileges attached to Membership, thereby inducing as many as possible to become Members of the Society.

N.B.—(1) Life Members, £25; (2) Annual Members: Family Members, £2 2s.; Ordinary Members, £1 1s.; Associates, 5s.

The Council has to express its indebtedness and hearty thanks to Mr. R. L. McDonald for auditing the accounts of the Society; to the City Council and the South African Association for the use of rooms for purpose of meetings, and also to the Press for its valuable assistance in reporting the affairs of the Society.

DRUMMOND CHAPLIN,
Chairman.

BALANCE SHEET AS AT 31st DECEMBER, 1925.

LIABILITIES.

	£	s.	d.	£	s.	d.
Life Members' Reserve Fund				505	0	0
As per last Balance Sheet.						
Subscriptions paid in advance				25	7	0
National Botanic Gardens, Kirstenbosch:						
Surplus for year 1925 ..	564	18	10			
Less paid over	200	0	0			
				364	18	10
				£895	5	10

ASSETS.

	£	s.	d.	£	s.	d.
Fixed Deposit	335	14	0			
Accrued Interest	16	13	7			
				352	7	7
Investment Account:						
Union of South Africa 5 per cent.						
Loan 1929/39 (Cost).	200	0	0			
Accrued Interest	2	18	1			
				202	16	1
Cash at Bank				340	0	2
				£895	5	10

REVENUE AND EXPENDITURE ACCOUNT FOR TWELVE MONTHS ENDED 31st DECEMBER, 1925.

EXPENDITURE.

	£ s. d.	£ s. d.
To Gathering of Members at Kirstenbosch	21 13 6	
Stationery, Printing and Advertising	10 17 0	
Journal Account	29 0 8	
General Expenses	50 11 8	
Bank Charges	1 19 1	
		114 1 11
Special Fund—Kirstenbosch Amount paid over to Trustees, National Botanic Gardens, Kirstenbosch (*per contra*).		100 0 0
National Botanic Gardens, Kirstenbosch Amount paid over to Trustees (*per contra*)		100 0 0
Balance—being surplus for year 1925		564 18 10
		£879 0 9

(Sgd.) DRUMMOND CHAPLIN, *Chairman.*
(Sgd.) H. T. TWENTYMAN JONES, *Hon. Treasurer.*
Cape Town, 21st January, 1926.

REVENUE.

	£ s. d.	£ s. d.
By Subscriptions:—		
Ordinary	460 12 0	
Family	116 6 0	
Associate	74 6 6	
		651 4 6
Donation		1 1 0
Interest		26 15 3
Special Fund—Kirstenbosch Donation: Sir H. Levick (*per contra*).		100 0 0
National Botanic Gardens, Kirstenbosch Donation: Divisional Council of the Cape (*per contra*) ..		100 0 0
		£879 0 9

Audited and found correct
(Sgd.) R. L. McDONALD,
Hon. Auditor.

List of Members of the Botanical Society

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary, P.O. Box 127, Cape Town.

ABBOTT, W. C.
Abercorn, Duke of
ADAMSON, PROF. R. S.
Ainslie, Miss F.
AKERMAN, CONRAD
Albrecht, C. W.
ALBU, SIR GEORGE (Bart)
Alexander, Miss E. J.
Alderson, Miss D.
Anderson, E. B.
Anderson, E. J.
Anderson, Mrs. E. J.
ALI, H. H. PRINCE MOHAMED
Allison, J.
Allison, Mrs. J.
Alston, Dr. J. A.
Alston, Mrs. J. A.
Amm, R. G.
Anders, Dr. H.
Anderson, Mrs. T
APSEY, T. J.
Arbuthnot, Miss I.
Arderne, H. R.
Armstrong, Mrs. W. H.
Arnot, Miss
Askew, F.
Auerbach, Mrs. J.
Augustus, I. S.

Babbs, A. T.
Babbs, Mrs. A. T.
Bacon, Lt.-Col. A. D.
Backhouse, J. S.
Backhouse, Mrs. J. S.
Baillie, Mrs. B. M.
Baker, Lionel
Baker, Mrs. C.
Ball, W. R.
Ballantine, Dr. A. J.
Barclay, Miss E.
Barlow, W.
Barnard, Dr. H. Keppel
Bartlett, Miss G.
Battenhausen, J. W.
Battenhausen, Mrs. J. W.
BAXTER, W. DUNCAN
BAXTER, MRS. W. DUNCAN
Bean, David
Beard, Miss H. E.
Beard, H. R.
Beard, Mrs. W. A. M.
Beattie, Sir J. Carruthers
Beattie, Lady
Beck, Lt.-Col. A. A.
Beck, Mrs. Arthur
Beck, Lady Meiring
Beck, T. E.
Becker, Mrs. D.
Becker, T.
BEIT, SIR OTTO
Bell, A. B.
BENNING, A. F. J.
Benjamin, Hon. Mr. Justice
Bennet, H.
Bennet, Mrs. H.
Bennett, A.
BENTINCK, VICE-ADMIRAL SIR RUDOLF
Bernard, Mrs. M. E.
Bertram, Mrs.
Beverley, Miss M.
Biggs, Miss D. I.
Biggs, Miss G.
Bisset, W. M.
Blake, Miss A.
Blake, Mrs. A.
Blakeney, J. M.
Blackbeard, Miss G. I.
BLACKBURN, A. L.
Blackman, A. C. M.
Blenkins, Mrs. W.
Blohm, Rev. W.
Bloom, O. H.
Bobbins, Miss A. H.
Boddam-Whetham, Mrs. R. E.
Bohling, Mrs. E.
Bohling, Miss
Bolus, H. H.
Bolus, F.
BOLUS, MRS. F.
Booth, Mrs.
Borcherds, Mrs. J. S.

Bowles, W.
Boyd, R. B.
Brandmuller, Ernst
BRAKHAN, A.
BRIETMEYER, L.
Briscoe, Mrs. J. E.
Bright, H. Hepburn
BRIMBLE, L. A.
Brink, Arend
Britten, Miss L. L.
Broom, Mrs. M. B.
Brown, Professor A.
Brown, Mrs. M. G.
Brownjohn, Miss
Brownlee, Lt-Col. J. I.
Brownlee, Mrs. J. Innes
Buckton, Mrs. F.
Buissinne, T.
Buissinne, Mrs. W. J.
Bull, Mrs. L. M.
Bullen, A. H.
Buller, A. C.
BULLEY, A. K.
Burtt-Davy, Dr. J.
Burtt-Davy, Mrs. A. B.
Burton, Mrs. H.
BUTCHER, W. E.
Butcher, H. J.

Caldicott, Dr. W. A.
Campbell, W. R.
Cape Town Training College
Cape Peninsula Publicity Association
Cape Natural History Club
Caplan, O.
Cartwright, F. E.
Cartwright, Mrs. F.
Cartwright, J. D.
Carter, Mrs., C. B. E.
Cave, Miss E.
Cavill, H. W.
Chamberlain, W. S.
Chamberlain, C. J.
Chandler, Miss C.
Chaplin, Sir Drummond, K.C.M.G.
Cheetham, Miss
Chiappini, A. L.
Chomley, Miss M. E., O.B.E.
Chubb, Dr. Elsie
Churchill, Senator the Hon. F. F.
Churchill, Mrs. F. F.
Cillie, Dr. G.
Cillie, Mrs. G.
City Tramways Co., Ltd.
Clark, Mrs. C. J.
Clark, W. E.
Clark, J.
Clarke, Miss E. V.
Clarke, E. D.
Clarke, Mrs. H. C.
Cleghorn, C. R.
Cloete, Miss C.
Close, J. E. P.
CLOSE, ADV. R. W.
Gluver, A. H.
Cluver, Mrs. A. H.
Cluver, Paul
Cluver, Mrs. Paul
Cocksedge, C. F.
Coetzee, Miss H. E.
Coles, Rev. H J.
Collegiate School for Girls, Port Elizabeth
COLTON, MRS. W.
Compton, Professor R. H.
Conradie, D. G.
Conradie, Mrs. D. G.
Cook, Miss A. D.
Copenhagen, Mrs. J. W.
Coutts, Mrs.
Coutts, Miss E.
CRAIG, J. W.
Crampton, Rev. W. Morley
Cummings, Miss A. M.
CUNNINGHAM, C. M.
Currey, Hon. H. L.

Dallas, Mrs.
Dale, D.
Dale, Mrs. H. R.
DALRYMPLE, COLONEL
Dalziel, Major E.
Daneel, Dr. P. M.
Darter, Mrs. E. L.
Davies, V. C.
Davies, M. L. de Waal
Davison, Mrs. J. F.
Dawson, E.
Day, Miss M. J.
De Beer, Mrs. A. A.
Delbridge, Miss L.
DE LINT, DR. R.
De Kock, K.
De Mole & Kisch
De Villiers, Hon. Mr. Justice M.
De Villiers, Mrs. M.
De Villiers, Mrs. C. C.
De Villiers, Miss W.
De Villiers, Mrs. B.
De Villiers, Miss J.
De Villiers, Mrs. A. B.
DE VILLIERS, LORD
De Villiers, Abram
De Villiers, Senator the Hon. I. W. B.
De Villiers, P. H.
DE VILLIERS, LOCHNER
De Villiers, J. J.
De Villiers Street School
De Wet, H. C.
Diamond, Mrs. F. W.
Diep River School
Divine, Mrs. F.
Donaldson, Mrs. A. G.
Donovan, Captain
Dockrall, T. A.
Dockrall, Mrs. T. A.
Dockrall, A. W.
Dockrall, Mrs. A. W.
Dominican Convent High School
DONALD, DR. J.
DOSE, W. K.
Downes, Major H. M.
Dowson, Miss E.
Douglas, J.
Drake, Miss C.
Dreyer, Miss V.
Duckett, Mrs. C. J.
Duff, Miss A.
Duff, J. A.
Dugmore, Miss H.
Duncan, G. A.
Duncan, T. H. M.
DUNN, MRS. A. A.
Dunn, Miss L. G.
DUTHIE, MISS A. V.
Du Toit, Mrs. A. L.
Du Toit, Miss M. E.
Dykes, W.

Eales, Mrs. H. M.
Earle, Miss K. M.
EAST, H. F.
Eastman, A. E.
Eastman, Mrs. A. E.
Eastwood, Miss A.
Eaton, Miss M.
EATON, W. A.
Eccles, J. H.
ECKSTEIN, F.
Edington, Thos.
Eddy, Miss D. M.
Edgar, Professor C. S.
Edgar, Mrs. C. S.
Edwards, Miss G.
Edwards, Miss G. E.
Edwards, M. G.
Eldred, H. W.
Ellerslie Girls' High School, Standard IV.
Ettmann, Rev. E. C.
EVANS, HUGH
Eyles, F.

Fairbairn, Mrs. F. W.
Fairbridge, Miss D.
Fear, H. G.
Felbert, T.
Finch, J. R.
Findlay, G. M.
Findlay, G. Stuart
Fisher, Miss M. L.
FitzHugh, Mrs.
FLANAGAN, MRS. F. F.
Forbes, Dr. A. Gordon
Forest Dept. (7 conservancies)
Forsyth, Alex.
FRAMES, P. ROSS
Fraser, J. B.
French, C. J.
Friedlander, Mrs. A.
Froembling, Dr. W.
Fuller, Dr. E. B.
Fuller, Mrs. E B.

Gajana, Mrs. F.
Galpin, E. E.
Galpin, F. H.
Galvin & Sales, Ltd.
Gamble, Miss A. A.
Garabedian, Miss S.
Gardener, W. C.
Gardiner, Hon. Mr. Justice
Garland, Miss M.
GARLICK, JOHN
GARLICK, R. C.
GARLICK, MISS W. M.
Garnett, G. S. B.
Garraway, Lady
Gemquand, Miss M. E.
Giffen, M. H.
Gilmore, Miss J. G.
Girls' High School, Oudtshoorn
Godbold, A. B.
GOHL, J. C.
Goldschmidt, Mrs. N.

Goodman, Mrs. Gwelo
Godman, Dame Alice
Gordon, Col. W. A.
Gowie, W. R.
GRAAFF, HON. SIR DAVID, Bart.
GRAAFF, SENATOR THE HON. SIR JACOBUS, K.C.M.G.
Graham, Miss E.
Grant, Mrs. A. J.
Grant, Dr. A. L.
GRAUMANN, SIR HARRY
Green, Mrs. E. Goodwin
Green, Mrs. G. A. L.
Grey, G. H.
GREENACRE, W.
Griffen, L. E.
Griffiths, Mrs. K. W.
Grobbelaar, J. J.
Groom, Miss D.
Groves, C. S.
Groves, Mrs. C. S.
Grover, Major P. G.
Guthrie, Miss L.

Hall, Mrs. E. Rowe
Hands, Sir Harry, K.B.E.
HARBORD, A. C. & MRS.
Hare, R. E.
Harper, W.
Harsant, Mrs. S.
Harsant, Mrs. J. W.
HART, MRS. N. M.
Harris, Dr.
Harris, Mrs. C. C.
HARRIS, SIR DAVID, K.C.M.G.
Harris, Mrs. E. W.
Harrison, Mrs. M.
Haumann, J. S.
Haupt, Mrs. F. J.
Haupt, Miss L. J.
Hayes, Mrs. E. A.
Hayward, Mrs. E.
Hayward, Miss H. D.
Hazell, R. W.
Head, J.
Heatlie, Mrs. J. H.
Hedley, Dr. E. P.
Heil, Dr. F. J.
Hellet, Mrs. M.
Henderson, Mrs. J.
Henderson, W. H.
Henkel, Miss P.
Hennessy, Sir A. T., K.B.E.
Henshilwood, Mrs. A. T.
Henshilwood, T.
Herman, Dr. C. L.
Hermans, H. W.
Herz, L.
Hewat, Mrs. M.
Hewat, Dr. B.
Heynemann, J.
HEYNES MATHEW, LTD.
Heyneke, Mrs. Paul
Heywood, Mrs. J. C.
Hilditch, C. H.
Hill, A. G.
Hind, W.
HIRSCHORN, F.
Hobson, J.
Hoey, H. G.
Hoffman, D. van V.
Hofmeyr, S. J.
Holland, F. H.
Honey, T.
Hooper, V. E.
Hooper, H. C.
Hopkirk, Miss L.
Horne, P. Stuart
HORTORS, LTD.
Howes, F. N.
Howie, Chas.
Hoy, Sir William
Hoy, Lady
Hudson, Miss
Hugo, Dr. D. de V.
HULL, Mrs. H. C.
Humby, A. J.
Humby, Mrs. A. J.
HUMPHREY, DR. W. A.
Hunt, H. F.
Hunt, W. P.
Hunter, S. J.
Hutchinson, R. W.
Hutchinson, Miss P.
Hurtzig, Mrs. L.
Hyland, Chas. W.

Imray, Miss G.
Ince, J. S.
Ingleby, Colonel T. J. J.
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(*a*) To encourage the inhabitants of South Africa to take an active part in the progress and development of the National Botanic Gardens at Kirstenbosch, a part of the Groote Schuur Estate, in the Cape Province, and to induce them to appreciate their responsibilities therein.

(*b*) To augment the Government grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch.

(*c*) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

(*d*) To enlighten and instruct the members on botanical subjects by means of rambles, meetings, lectures, and conferences, and by the distribution of literature.

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OF SOUTH AFRICA

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Part XIII 1927

Published under the authority of the Council of the Botanical Society

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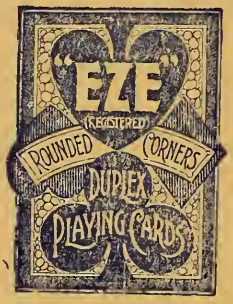

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PLATE I. MUIRIA HORTENSEÆ AND GIBBÆUM ALBUM ON THE LITTLE KAROO.

The Journal of the Botanical Society of South Africa

EDITED BY R. H. COMPTON.

PART XIII 1927

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News and Notes.

THE following table shows the growth in Membership of the Botanical Society since its foundation.

	Life.	Family.	Ordinary.	Associates.	Total.
1914	33	22	264	33	352
1915	46	26	263	32	367
1916	49	26	264	45	384
1917	46	24	249	53	362
1918	49	28	281	78	436
1919	50	38	320	84	492
1920	54	45	384	237	720
1921	54	48	407	287	795
1922	55	52	418	301	826
1923	59	50	405	269	783
1924	62	57	455	313	887
1925	62	58	462	330	912
1926	65	60	481	341	947

The Society therefore grows steadily, and the thousand mark is now within easy reach.

* * * * *

It would be an admirable thing if the Botanical Society were able to go to the Government and say "Here are a thousand people who understand the importance of Kirstenbosch, who realise its financial needs, and who are contributing from their own purses to the support of our great national garden. This is no spasmodic effort. The majority of the thousand have quietly helped Kirstenbosch year after year, asking nothing in return but the privilege of sharing in the burden of its development. Such support justifies us in calling upon the Government to do its share. Kirstenbosch is a public institution, a matter of national concern, and should be supported adequately from national funds. Private generosity has done and is doing its part: and this gives us the right to ask the Government to do its part also."

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The present issue of the JOURNAL OF THE BOTANICAL SOCIETY is very largely devoted to the subject of South African succulent plants. No part of the world approaches South Africa in the number and variety of its succulents, and these amazing plants form one of the most distinctive and characteristic sections of the flora of the country. Almost every family of plants occurring in this country comprises certain species of a succulent habit, and some families are almost entirely composed of succulents. One of the most puzzling problems in botany is to explain why so many South African families should run to succulence, whereas in the flora of Australia — a continent closely resembling South Africa in climates and soils — there are practically no succulents. In the Southern parts of North America succulent plants are abundant, but practically all of them belong to the family Cactaceae. Another curious problem is presented by the similarity in external form of many of the Cactaceae to that of certain South African succulents, particularly the Euphorbias: and a solution of this problem would bring us much nearer a general solution of the problems of evolution and adaptation.

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Mesembrianthemum is one of the most characteristic South African genera, occurring in every association except the aquatic and woodland; being most abundantly present in the more arid parts of the winter-rainfall districts, and to a less extent in the grassland and savannah associations of the summer-rainfall areas. This vast genus, consisting entirely of succulents, and numbering several hundred species, is now being studied more closely than ever before, and is being broken up into numerous new genera on various grounds. This work is being carried on principally by Mr. N. E. Brown at Kew, by Mrs. Bolus at Kirstenbosch, and by Dr. Schwantes and Dr. Tischer in Germany. An article from Mrs. Bolus' pen is included in this issue, and is accompanied by two coloured plates illustrating some of the principal new genera. This will be of great interest to the increasing number of amateurs of these interesting plants as well as to botanists.

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The publication of coloured plates in this issue of the JOURNAL is an innovation which we venture to think will be appreciated. Accurate coloured illustrations are almost essential to a proper appreciation of plants, in the absence of the living originals: but considerations of expense make it impossible to do more than a very limited amount in this direction. The matter contained in the JOURNAL

depends very largely on the membership of the Botanical Society: and an increased membership would enable us to publish an improved JOURNAL.

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Mr. J. W. Mathews, Curator of Kirstenbosch, has contributed an article on the cultivation of succulents, with special reference to Cape Peninsula conditions, but applicable over a much wider area. To accompany this article we publish a number of photographs showing certain succulents in cultivation at Kirstenbosch. Two other illustrations show striking succulents as they grow in nature. Our Frontispiece is from a photograph taken by Mrs. Levyns of two of the rarest and most remarkable of our stemless "Mesembrianthemums," namely *Gibbaeum album* and the newly named *Muiria Hortenseae*, growing in that succulent *sanctum sanctorum*, the Little Karoo. The latter plant is named after Dr. J. Muir and his daughter, Miss Hortense Muir, and the locality on which it grows was formally "dedicated" to the National Botanic Gardens this year by Dr. Muir.

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We publish an article by Professor Adamson of the University of Cape Town on some of the exotic trees and shrubs which are so conspicuous a feature of the Kirstenbosch landscape. Some of these are intrinsically beautiful: — others have proved such aggressive weeds that their extermination is most desirable — and incidentally most difficult and expensive.

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We publish a letter from a Sydney (New South Wales) correspondent who formerly lived in South Africa and who has taken a lively and affectionate memory of the Cape wild flowers with him to his new home. The flowers of South Africa seem to be much more valued in Australia than they are here, and a large number of them are found in the Australian nursery lists. The love for our native flora is, however, undoubtedly increasing in South Africa, largely owing to the influence and practical example given by Kirstenbosch. A large number of our plants are of enormous gardening value, and many are very easy to grow: and anyone who wants to get out of the petunia-marguerite-hibiscus rut will find in the cultivation of our native shrubs and bulbs the most delightful of pursuits.

And apart from the natural beauty of our indigenous plants, there are two reasons why South Africans should grow them in their gardens. One is because these flowers have their intimate associations with scenes of beauty: they carry memories of open-air days, among mountains and vleis and on the rolling veld. Lovely as they are, what associations have roses and sweet-peas that can compare with these?

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The other reason why we should grow South African flowers in our gardens is because they *are* South African. When love of country is linked with beautiful things like flowers, instead of with hideous things like war, then we shall have a truer patriotism than we know to-day.

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One is sometimes tempted to say that the South African hates his wild flowers. Such a statement would of course be hotly denied, yet actions speak louder than words. The senseless destruction of wild flowers which takes place day by day and year after year by the very people who profess to love them leads one to wonder whether blindness or hypocrisy is the more striking characteristic of the human race. If wild flowers were a plague which had to be stamped out, our efforts could hardly be more vigorous or meet with greater success. We seem to be absolutely ruthless in our determination to be rid of them. Rats and flies hold their own, but heaths and orchids are going and many will soon be gone. We burn our flowers, uproot them, waste them by the wagon-load, make them the subjects of senseless competition, exploit them for gain, tear them to pieces to construct monstrosities, and yet we claim to love them.

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The Wild Flower Shows of the Western Province are frequently blamed for encouraging the wasteful destruction of wild flowers, and one is bound to admit that there is much to be said against the principles that seem to underlie some at least of these shows. The whole subject was recently discussed by the Botanical Society, and it became clear how strongly public opinion is turning against the destruction of masses of wild flowers for commercial and prize-hunting ends, under the opportunity given by wild flower shows. On the pretext of producing a good show for the good of the town collectors pillage the veld in a way that they would not tolerate for a moment if the flowers were growing in their own gardens. The result is far from being a credit to the people of the district, however gorgeous a display may be produced for a few hours.

Of all the people in the western districts who ransack the country so that they can compete in their wild flower shows, how many love their flowers sufficiently to try and grow them in their own gardens? Who in Caledon grows the Caledon heaths which are displayed there so lavishly? How many in Malmesbury grow the afrikanders which are being so rapidly exterminated in that district? Do the people of Darling cultivate the Nemesias for which their neighbourhood is famous? How much have the people in wild-flower-show districts of the Western Province done to perpetuate, protect and propagate the flowers of which they boast? We have no reason at all to boast of our wild flowers; quite the contrary. The flowers we exhibit are the ones that have miraculously survived the attacks hitherto made on them. The pickers have to go far to find them to-day; the day is coming swiftly when they will no longer be able to find them at all.

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There are wild flower shows — two or three — into which the spirit of prize-hunting does not enter, and in which the commercial motive does not exist. Efforts are made to check waste, and the show is regarded as a festival and as a display of the riches of the district to the discriminating visitor: no attempt is made to stagger him with vulgar masses of flowers, but quality and variety are preferred to quantity. No objection can be raised to these motives, and flower shows run on these lines do good rather than harm: they produce pleasure and interest rather than giving that sense of wholesale destruction which pervades the commercialised and competitive shows. The wild flower shows can be beautiful, educational and uplifting, both to the people of the district and to visitors: but prize-hunting and the commercial motive make them distinctly the reverse.

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But it is not only the commercialised wild flower shows which exhibit the love for flowers as a destructive emotion. That mania, severe as it is, lasts for three or four weeks only. Day in and day out, the whole year round, the flowers we love and mention with pride are being uprooted, mutilated, prevented from reproducing themselves, with that implacability which results from a commercial demand. It is a legal offence to sell many of these flowers: it is no offence to buy them. Yet the purchaser, who creates the demand, is more to be blamed than the seller who finds in it merely a method of earning a living. The purchaser is inciting the seller to commit an offence: yet it is only the seller who has to keep an eye open for a possible (though highly improbable) policeman. The protected flowers themselves acquire an added commercial value from having to be smuggled: and the chief effect of the Wild Flower Protection Ordinance seems to be to put up the market price of the flowers. It is most grievous and deplorable that our wild flowers, the most beautiful things South Africa possesses, should be the subject of all this mockery and injustice. Perhaps after all it is no exaggeration to say that South Africans hate their wild flowers.

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The Council of the Botanical Society has recently considered the question of the establishment of local nature reserves in the neighbourhood of many of the towns in the Union. The destruction of the local flora and fauna by the spread of the towns and the development of agriculture, as well as by flower-picking, veld-burning, grazing, shooting of birds and animals, robbing of nests and other forms of vandalism, has led to a serious demand on the part of those who love the natural wealth of South Africa that some fragments at least of this wealth should be preserved from the general ruin. It was felt that if the residents of each town and village took under their protection some piece of ground, large or small, where natural conditions still existed, a most valuable series of reserves would be created. Each district has its own special scenery, flora and fauna; many of the most precious of our wild flowers, for instance, are confined to very limited areas: if they are lost to that area they are lost to the world.

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The Botanical Society addressed letters to the Magistrates in a number of centres urging them to take steps to rouse local interest in this matter, and satisfactory response has been received from several quarters. Near Cape Town we already have the Upper Kirstenbosch Nature Reserve. At Queenstown part of Madeira Kop has been granted to the Horticultural Society for the purpose of a wild flower reserve. At Hermanus the isolated kopje near the town has been reserved for the same purpose. At Caledon the Municipality is considering the establishment of a wild flower reserve on the Park just above the town. At Montagu the Municipality are moving in the direction of reserving the magnificent Baths Kloof as a nature reserve and bird sanctuary. At Bloemfontein it is probable that Naval Hill may be adopted as a nature reserve. Similar ideas are emerging in other centres also. At Ceres, Malmesbury, Darling and Tulbagh, to name only a few places, there is urgent need for the establishment of nature reserves if these districts are not to lose their reputation as wild flower centres.

In addition to the movement in the direction of local reserves, there is now being promulgated a demand for the establishment of a National Park in the Cape Province. The Mountain Club has recently called a conference on the subject, and the National Society, the Wild Flowers Protection Society and the Botanical Society are collaborating. It is hoped that a scheme will be evolved which it will be possible to lay before the Government during the next session of Parliament. The National Parks of the United States and of other countries are such enormous assets in every way that there is every encouragement for the establishment of Parks on similar lines in South Africa. The Kruger National Park in the Transvaal and the Mont aux Sources National Park in Natal already exist and are proving their value: it is time that the Cape Province should have its Park also.

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The Botanical Society has voted a sum of £300 towards the construction work to be undertaken in the new Succulent Garden at Kirstenbosch. This Garden was initiated as far back as 1922, when the ground was cleared and trenched and when a number of members of the Botanical Society laid its foundations by planting various tree Euphorbias on the site. In the five years that have elapsed the Euphorbias have grown exceedingly well, but apart from periodical cleaning of the ground and the cartage of large boulder stones to the site no further work has been done until now. The funds available have been completely used in maintenance of the established parts of the Gardens and in the provision of sites — more urgently required and more cheaply obtained — for the Heaths and Proteaceae. With the prospect of slightly increased funds for maintenance it has been decided to proceed with the Succulent Garden and the Botanical Society has drawn on its capital funds to assist in this important work. These funds are derived from the subscriptions of Life Members which are invested and are ultimately devoted to permanent improvements at Kirstenbosch. It may be recalled that from this source were financed the whole of the rock work in the Fern Dell and Aloe Kopje and approximately half the cost of the Tea House.

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The success of the tree Euphorbias on the site of the Succulent Garden is a good omen for the other large succulents which will eventually be planted there. It is believed that a large number of succulent plants, although specially adapted to withstand arid climates, will be capable of successful cultivation at Kirstenbosch if planted on a suitably prepared site in the open. Many of the difficulties and losses that have attended the cultivation of succulents in the past have certainly been due to the fact that they perforce remained indefinitely in tins in the Nursery: and in fact, the under-financed condition of the Gardens has had no more cruel and heart-breaking effect than this. The donations of Sir Otto Beit and others, together with Government subsidy, have enabled successful cultivation of the smaller succulents in shelter: and it is now hoped that it will be possible to treat the larger succulents in a satisfactory way also. In this way one of the severest — albeit undeserved — reproaches that Kirstenbosch has had to bear in the past should be removed.

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The Karoo Garden at Whitehill continues to progress satisfactorily considering its very exiguous income. Every penny of this is derived directly from private generosity; no subsidy is received from Kirstenbosch nor from the Botanical Society, and no contribution has been sought from Government. The Curator, Mr. J. Archer, works almost single-handed, with temporary assistance by one coloured boy. A very extensive collection of succulent plants has now been established, a water supply laid on, paths made, and a great number of plant-determinations made at the Bolus Herbarium. The Garden has already demonstrated its value in connection with systematic research.

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At present there is no house at the Whitehill Garden, and the Curator travels there every day from Matjesfontein. This is very unsatisfactory in many ways: for instance, the watering work which should be done only in early morning and late evening in the summer has to be done during the heat of the day: and there is no proper supervision of the Garden at week-ends when visitors frequently arrive. A fund has been opened to build a cottage for the Curator, Mrs. J. D. Logan Senr. heading the list with a donation of £100. The Railway Horticultural Society is devoting the net proceeds of its Summer Show at Cape Town to the same object. Further subscriptions are earnestly invited and may be sent to the Director, Kirstenbosch. It is anticipated that approximately £800 will be required, and the Trustees have agreed to ask the Government for a £ for £ subsidy provided the necessary donations are forthcoming.

We have received a collection of short essays reprinted from the "Southern Cross" under the title "Nature Study." These were the outcome of a prize offered by Mr. E. S. Laughton of the Forest Department and are all written by South African school children under 18. Many of the essays are of the familiar type in which the writer says what he is expected to say instead of what he himself thinks: in fact, they reveal the prevailing fault of our schools, namely too much teaching and not enough education. But a real love for and interest in nature shows through the verbiage in some of the essays and this is the spirit that should be encouraged in South Africa where nature is so extraordinarily prodigal of her gifts. The booklet is edited by the Rev. Dr. D. P. Murray of Brakpan, Transvaal, from whom copies can be obtained, price 1/-.

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The vegetation of Table Mountain has aroused much interest among botanists and owing to its relative accessibility it has often been taken as a type of the South West Cape flora as a whole. Descriptions have been given by Engler, Marloth, and Bews; and Professor Adamson has recently published (Journal of Ecology, August 1927) a valuable introductory account of "The Plant Communities of Table Mountain," in which the modern ecological treatment of the subject is adopted. The idea of "succession" is fundamental, vegetation being no longer regarded as a static aggregation of species, but as a living growing complex organism having a developing relation with its surroundings. Fire necessarily plays a very important part in the plant-succession and in determining the surface-features of an area, and Professor Adamson confirms the views of previous writers in saying "The effects of fires and especially of recurrent fires are the impoverishment of the soil by reduction of humus, the increase in the liability to drought in summer and soil erosion in winter. The effects of fires in these directions are to some extent cumulative and tend to become more pronounced." In this very moderate way Professor Adamson indicates what will inevitably happen in the Cape Peninsula and other parts of the coastal belt if the present reckless practice of veld-burning is continued.

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The discovery of a new Sundew in the marshes of the Wellington Sneeuwkop by Mr. J. Rennie is an event of considerable interest from more than one point of view. The new species is by far the largest of the South African sundews: its leaves are the largest of any known species and may exceed two feet in length in shady situations; and the inflorescence is about as long as the leaves and bears a number of rosy or purple flowers nearly an inch and a half in diameter. It is a most striking and conspicuous plant, and the astonishing thing is that it should not have been discovered long ago: this being convincing evidence of the imperfection of our knowledge of the flora of even the most accessible mountains. Since the first discovery, this new species has been found in other localities in the Sneeuwkop-Slanghoek group of mountains. The plant has been appropriately named *Drosera regia* by Miss E. L. Stephens, to whom Mr. Rennie brought his first specimens, and who described and figured it in the Transactions of the Royal Society of South Africa 1926, p. 309.

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The family Iridaceae is abundantly represented in the Cape flora, and many of our best known and most showy plants belong to it — Gladiolus, Watsonia, Sparaxis, Moraea, Ixia, Antholyza are some of the familiar genera. These are typically "bulbous," having underground storage organs in the form of tuberous stems (corms or rhizomes). A few species, however, are extraordinary in having leafy stems above ground, which last from year to year and may become hard and woody: for instance certain species of Aristea with their bright blue flowers, Witsenia the well-named bokbokiri's tail, and the curious genus Klattia of which a second species was one of Mr. T. P. Stokoe's most interesting recent discoveries. These woody-stemmed Iridaceae have been the subject of an anatomical investigation by Professor R. S. Adamson, who has published his results in the Transactions of the Royal Society of South Africa 1926 p. 175, and who finds that definite secondary growth in thickness of the stems takes place, this feature being quite absent from their "bulbous" relatives.

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Dr. T. R. Sim's most recent book is entitled "Tree Planting in South Africa" and is published at Pietermaritzburg at 15/-. Dr. Sim has in the past been the author of valuable works on the indigenous trees of the sub-continent, in which he has set forth the properties of their timber and their economic value. He now casts aside what he calls "sentiment," by which he means any attitude except that inspired by considerations of cash returns, and comes down whole-heartedly on the side of the gums and the pines. He speaks of the "sentimental craze" for maintaining the indigenous forests, and prefers to cut them out completely and replant with crops of rapidly growing exotics. He is so devoted (almost one may suggest to the

point of sentiment!) to pines and gums that he credits them with virtues which have never been proved, as when he attributes to them the power of " transpiring most and so keeping the atmosphere moist and preventing flood ": but he does not mention the widespread belief that gum plantations dry up springs which formerly ran when the catchment was covered with natural bush. Nobody denies the productivity in cubic feet of timber of gums and pines: but to deny the value of maintaining the indigenous forests is to advocate commercial vandalism of a most deplorable type, and one can only be glad that the Forest Department has not embraced Dr. Sim's one-sided views of the " timber problem."

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Recent issues of the periodical " Flowering Plants of South Africa " have been largely occupied with descriptions of various interesting novelties by Mrs. Bolus, Curator of the Bolus Herbarium, with illustrations from paintings and drawings by the late Miss M. M. Page, botanical artist to the Bolus Herbarium. Many new species (and some new genera) which would formerly have been grouped under Mesembrianthemum, as well as some new Orchidaceae and Iridaceae, have thus been published, and in this way the " Flowering Plants " is performing a useful service to Botany, even though the quality of the plates is sadly inferior to that of the original drawings. In Part 26 nine out of ten subjects are contributed by the Bolus Herbarium, but the articles are unfortunately not signed and the cover states that the illustrations were prepared by the Division of Botany, and that Dr. Phillips and Mr. Hutchinson are responsible for the descriptions. The plants in question, moreover, are said to have been grown at the Union Buildings, Pretoria, which seems very improbable: as a matter of fact many published in the last three parts were grown at Kirstenbosch, and others have never been grown in any garden. It may be hoped that these and other errors on the cover will be corrected in future issues.

The Botanical Society entertained to luncheon Dr. J. P. Lotsy, the distinguished Dutch botanist, on 27th April 1927, at the Opera House Restaurant, Cape Town. Dr. Lotsy had undertaken an extensive tour in South Africa, and was on the eve of returning to Holland. In his address he gave a most interesting account of some of his experiences and of the evidence he had been able to collect on the subject of hybridisation as the basis of evolution. Miss Lotsy and Dr. Goddijn were also present at the luncheon. Sir Drummond Chaplin presided and General Smuts delivered a speech.

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The death of Rudolf Schlechter on 15th November 1925, at the early age of 53 removes from the botanical world one of the most energetic travellers and collectors of recent times. It is of interest to note that he served his apprenticeship, as it were, as a collector in South Africa. He arrived here in 1891, as a young man of 19, and after working under Mr. H. M. Arderne at The Hill, Claremont, became Herbarium assistant to Dr. Bolus. Later he undertook many collecting journeys, and achieved the great total of about 7000 numbers in the course of the three and a half years that he spent here. He returned to the Cape in 1896 and travelled with his brother Max Schlechter, again collecting great quantities of material, and finally left for Delagoa Bay in December 1897. By this time he had collected no fewer than 11,514 numbers, many of which included several (up to 100 in some instances) individual specimens. Schlechter worked out many of his specimens himself during his periods in Europe. In later life he travelled very extensively in the tropical East Indies, New Guinea, New Caledonia and other countries, both as a general collector and as a specialist on the orchids. The Bolus Herbarium owns a comprehensive set of his South African material.

Notes on Mesembrianthemum and Allied Genera.

AMONG the many succulents for which South Africa has long been famous, *Mesembrianthemum* has for the last few years been attracting most attention, both at home and in Europe. Several hundred species have been grown and flowered at Kirstenbosch; and one may safely estimate the number of new ones included in these as being well over a hundred, not to mention the scores of obscure species previously known from a short description, with or without an accompanying sketch, but with never a flower or leaf preserved in herbaria of the actual plants described. This state of things, of course, is only what could be expected in the circumstances. For South Africa a century and a half ago was, in more senses than one, more remote than it is to-day; and plants, grown under glass and tended like precious human beings, were far beyond the reach of the few who were at that time making dried collections. But "we have changed all that," and some day when means permit of our publishing the full results, many will share in this acknowledgment of our debt of gratitude to the National Botanic Gardens for their great achievement in making so much valuable material available for study.

As early as 1648 we find Bobart giving the total of Mesembrianthemum-species known as fifteen, and in 1689 when Herman wrote this was increased to twenty-three. Herman, by the way, spelt the name with an "i" in accordance with the derivation from the Greek *mesembria* = middle of the day, *anthemum* = flower. Linnaeus in 1753, changed the "i" into "y" — an interchange permissible in a Latin name, but not in a Greek one — and the result is that those who logically adhere to following Linnaeus' standard continue to perpetuate the erroneous "y," while others prefer to adopt the more correct spelling.

Notwithstanding its length, the name is a happy one, since by far the larger majority, and these with the greatest profusion of blossom, are at the height of their glory when the sun is hottest. They are what might be called the "normal Mesembs." which on a sunny morning in early summer open as early as 9 o'clock, prepared to radiate their beauty until the sun's decline sends them dozing gently off into a long night's sleep. But other species keep very different hours for waking and sleeping; and at certain seasons of the year one could arrange a complete floral clock, selecting one or more species for each of the 24 hours. Some refuse to rouse themselves till the clock has struck one on a reasonably fine afternoon, and then, with their yellow "powder-puffs" turned towards the sun, they keep watch until it sinks below their horizon. These are the post-meridian species like *M. pomeridianum* and *M. pugioniforme*. Others are not ready to open till about 4 o'clock, and scarcely wait till dusk with their one large flower whose crimson-backed orange petals glow in harmony with the sunset hues. The fragrant vespertine species in white, pale pink, and varied tones of yellow, may keep their torch alight till 10 o'clock or later; but the night-flowering ones prolong their vigil till early morning. Finally there are the very wideawake flowers with petals expanded throughout the livelong day and night, wet or fine, like *M. inclaudens* (non-closing). These have their pollen most effectually protected by the incurving of the stamens which are entirely covered and hidden by the rather rigid and densely packed inner petals.

There is scarcely ever the slightest difficulty in recognising a "vijgie" if it is in bloom: the round flowers, whether they glitter at noon, or glow more softly in the afternoon, or glimmer in the evening, all have a strong family likeness. And yet to those who grow and study them endless shades of difference are revealed in every organ. The petals of the noon-flowers, whether in one or more rows, spread out stiffly, making an admirable landing-place for the larger insects like bees and beetles. Those of the pomeridian species have a fluffy look, because they are arranged in various positions — some recurving, others spreading, and the inner ones set at all angles between this and the perpendicular, as if to be ready to close over the exposed pollen immediately should rain be imminent. The sepals spread or recurve in accordance with the petals. Perhaps there is most variation of all in the set of the stamens, and correlated with it the extent to which the pollen is exposed; and these variations, more than any other feature, give the flower a definite character. In the vast majority the stamens are in several series, the younger ones towards the centre and gradually decreasing in length. Here, some flowers on first opening show all their anthers (and most of them shedding pollen) forming a raised golden mass in

the middle and adding considerably to the beauty of the whole. Others have the stamens closely packed together in a cone-formation and surrounded by a belt of staminodes which overtop them, leaving only a small opening at the summit through which the anthers are partially visible. Then there is the arrangement into a column without staminodes which is usually the tallest of all the three raised formations. In all cases the stamens eventually loosen and wither, and leave the central space free for the display of the stigmas which, in the second stage of the flower, are ready for cross-pollination. In sharp contrast to the flowers with high centres are the flat ones of the "inclaudentes" mentioned above, and the funnel-shaped ones where there is a slight dipping from the circumference inwards, so that the centre is more or less sunk. In the latter type the petals are united in their lower part and the tube thus formed encloses most of the stamens. Staminodes bearing empty and deformed anthers radiate from the centre and take their share in forming the corolla, the transition from staminode to petal being so gradual that it is impossible to fix a dividing line.

Passing on to the other parts of the flower, we find the receptacle exhibiting several distinct forms, the commonest being the club-shape (clavate) where the gradation into the peduncle is prolonged, the top-shape (turbinate) where this is more abrupt, the semi-globose or cup-shape, and the more shallow saucer-shape in both of which the differentiation between the peduncle and calyx is definitely marked. At the summit of the receptacle (which is sometimes produced beyond the ovary into a tube) there are nearly always glands, either united in a ring, or separate and their number corresponding to that of the sepals and carpels, their position in both cases being always in contact with the base of the stamens. When the glands are absent there are depressions on the periphery of the ovary in which nectar is contained.

The top of the ovary may be concave, flat, or convex, and the number of stigmas ranges from 4 to 20 or very rarely more, 5 being the commonest number. Far more often than not there is no style and the stigmas are free to the ovary. There is considerable diversity in the shape of the stigmas and their length relative to that of the stamens. Usually they are shorter than the latter, and the form is subulate or awl-shaped. Apart from the few remarkably short ones there are numerous intermediate forms between the subulate stigma and the long thread-like kind, well overtopping the stamens and appearing to be ripe contemporaneously with them. As a rule the ovules are numerous and placed either on the outer wall of the ovary or in the centre.

In the fruit the extent of variation seems endless. Three distinct main types may be noted. First, there are the well-known edible "vijgies," indehiscent juicy fruits with their myriads of tiny seeds resembling the "pips" of a fig. Second is the solitary instance known to me of the capsule breaking up into one-seeded winged segments which gradually become disintegrated from the receptacle. The latter itself becomes light and papery and is easily detached from the plant to be blown about as the segments are being liberated; or the whole plant loosens its hold in the sand and is borne hither and thither by the summer south-easters. Thirdly, in all the remainder of this large group we have the dehiscent type with its manifold and complicated mechanisms. In two particulars, however, they are all alike — namely, the capsule opens in response to being wetted, so that Nature seems to have arranged the release of the seeds when the moistened ground is best fitted to receive them; and the valves open from the centre outwards leaving the compartments below lidless but otherwise intact. Each valve has a pair of stays or "keels," sometimes so close together as to appear welded into one, sensitive to dampness. So long as these are kept moist the valves remain outspread, and as they dry the valves return to their original position and the capsule is entirely closed once more. In a number of species, including all those with a central placentation of the ovules, there is no roofing membrane over the compartments when the valves are outspread, and the seeds are visible. In others there is a roof extending across from the centre to the margin, leaving an aperture through which the seeds may escape. Frequently, however, this aperture is more or less closed by a "tubercle" which surmounts the placentas. In some of the tubercled forms we have found the seeds germinating in the capsule, and one of these seedlings reached maturity and flowered freely. Two young wild plants of *M. pomeridianum* in flower were still attached to the capsules, the roots having penetrated through to the soil. Sometimes it would almost seem as if the tubercle were purposely large to prevent any possibility of the seeds escaping, and that then the only opening was the parting of the roof-membrane down the middle. (We have noticed, by the way, that in two instances the tubercles and some of the surrounding tissue were eaten during the night.) The seeds are generally small and numerous, with long funicles, pale to dark brown in colour or occasionally black, and almost smooth or variously dotted or tuberculated and crested. The embryo curved round the albumen gives the seed a rounded apex; and when the albumen is completely encircled the seed is either nearly spherical in outline or varies towards the pear-

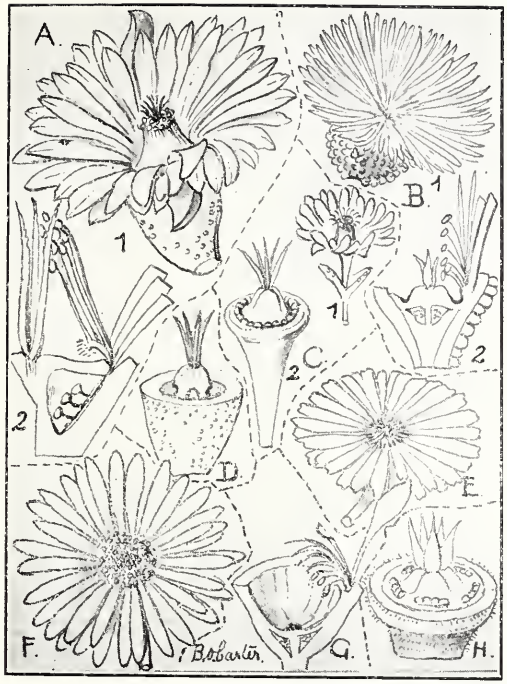
shape. Otherwise the form approximates the figure of two-thirds of a circle.

With all these differences manifested in the flowers and fruits, and considering the enormous number of species in the genus *Mesembrianthemum* as it was formerly constituted, one is scarcely surprised that Haworth more than a hundred years ago began segregating sections, several of which he believed would be considered distinct genera; and that he even went the length of actually publishing some of them — so convinced was he of the validity of their claim to generic rank. Within the last two years the splitting has gone on apace, and what with the new combinations and the new discoveries the number of genera must by now have reached the astonishing sum of a hundred. And there are certainly more in prospect; for having once begun the difficulty is to know where to stop. The " key " appended, dealing with the group as represented on the Cape Peninsula, will serve to give some idea of how the recently constituted genera differ from one another.

Of the many fascinating growth-forms which occur in this group it must suffice to mention a few of the more remarkable ones only. Here undeniably the leaves play the most important role. Beginning with " cone-plants " (*Conophytum*) where each branch consists of a pair of closely welded leaves. having but a small orifice at the top through which a flower emerges, we pass on to the " stone-faces " (*Lithops*) where the welding of the leaves is less, and a slit is left right across the summit and a short way down each side of the " body." A third form also has the leaves of a pair closely united, but one is shorter than, and rather differently shaped from, the other, and sometimes looks like a gibbosity or hump on it. These are the gouty or gibbous plants (*Gibbaeum*). The " tongue-leaves " (*Glottiphyllum*) have the individuals of each pair unlike each other to some extent; but they are curious in the way they often set their densely packed. luscious, green leaves edge-on to the sun. placing the other edge on the ground. Sometimes this leaf-difference or heterophylly is carried further. and there are one or two instances in which no two leaves of the six to eight on a branch are alike: mosaic-like the concavity of one leaf is filled in by the convexity of another. In certain genera. on the other hand, we find the year's growth on each branch consisting of two pairs of leaves. the individuals of each pair similar; but the lower pair is welded (in the " bead-plants") into a smooth bead-like form and looks very different from the elongated (2-4 inches long) separate leaves glittering with papillae. Then there are the " mimics " or " simulators " like *M. simulans*, *M. Bolusii*, *M. lapidiforme* with large swollen leaves whose size, shape, and the appearance of their surface so closely resemble stones that, without flowers, these plants merge imperceptibly into their surroundings. All these forms have their short branches crowded together and the leaf-pairs so closely set that the internodes are not apparent. With few exceptions the leaves are huddled together in rosettes with their tip to the sun, a habit common to many xerophytes, whether their purpose be to keep warm or cool according to the climate and soil of their habitat. For, as the old botanist, Theophrastus, wrote somewhere about 300 B.C. — " It is perhaps also proper to take into account the situation in which each plant naturally grows or does not grow. For this is an important distinction, and specially characteristic of plants, because they are united to the ground and not free from it like animals." Such considerations will enable us to appreciate adequately the many devices adopted by vegetation for carrying on an existence in adverse conditions.

Most interesting indeed are the devices exhibited by the *Mesembrieae* for resting over from one growing-season to the next. Apart from the annual-form which accomplishes its life-cycle within three or four months, and the few species that are deciduous or that have ample reserves in their tuberous stems or roots. we find the future growth protected marvellously well by the remains of those same leaves whose glorious bit for the welfare of the plant was done during the preceding growing-period. They persist either as a whole or as a part, completely ensheathing the developing growth; or the whole leaf falls except the broad, protecting. scale-like base, so that the branches have a bare and rush-like appearance: or the leaves may persist in a skeletonised form. or hardened into spines and affording some measure of shade from the burning rays of a summer sun in Namaqualand, where of all parts in South Africa *Mesembrieae* do most abound.

L. Bolus.



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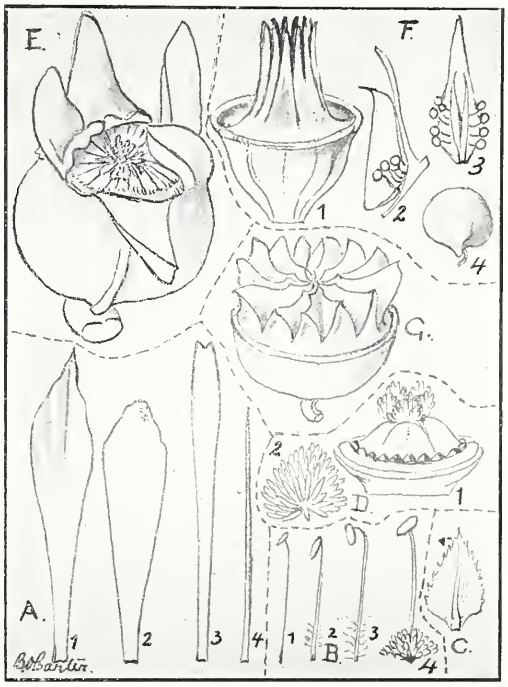

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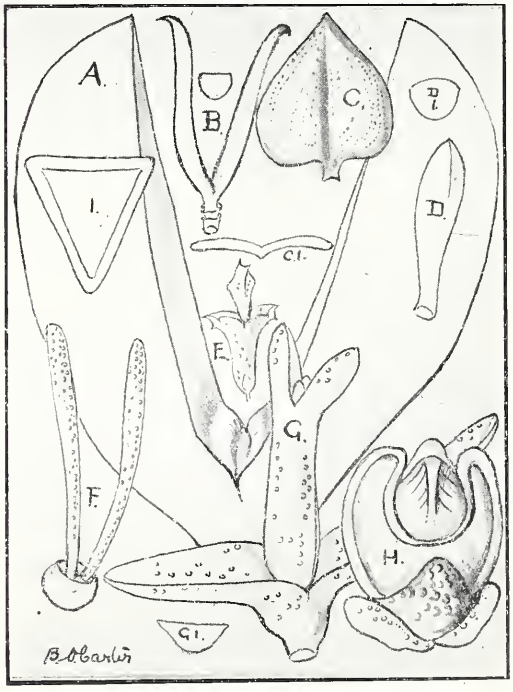

IV.

PLATE IV. MESEMBRIANTHEMUM AND ALLIED GENERA.

KEY TO THE GENERA OF MESEMBRIEAE REPRESENTED ON THE CAPE PENINSULA.

1. Biennials or perennials — 2
   Annuals. — 13
2. All the leaves opposite — 3
   Some of the leaves alternate — 9
3. Fruit juicy, indehiscent — **Carpobrotus** (3 species)
   Fruit dry, dehiscent — 4
4. Large afternoon-flower; stigmas 10—20 — **Conicosia** (1 or 2 species)
   Small or medium-sized day-flowers; stigmas 4—6
5. Stamens incurved and hidden by staminodes; flowers not closing at night — **Erepsia** (8 species)
   Stamens more or less erect; flowers closing by sunset — 6
6. Stems contracted at the nodes; leaf-base persisting as a scale — **Psilocaulon** (1 species)
   Stems not contracted; leaves falling entire — 7
7. Tubercle absent in the cells of the fruit — **Mesembrianthemum** (31 species)
   Tubercle present — 8
8. Tubercle 2-lobed; plants growing in brak ground — **Disphyma** (1 species)
   Tubercle entire; plants not growing in brak ground — **Ruschia** (3 species)
9. Large yellow afternoon-flowers; stigmas 10—20. — **Conicosia** (1 or 2 species)
   Day-flowers; stigmas less then 10 — 10
10. Leaves terete; stems elongate, creeping — **Sphalmanthus** (1 species)
    Leaves not terete; stems decumbent — 11
11. Leaves with wavy margins, conspicuously papillose — **Cryophytum** (2 species)
    Leaves flat; papillae inconspicuous — 12
12. Leaves dark green; receptacle longitudinally ridged — **Skiatophytum** (1 species)
    Leaves pale grey-green; receptacle not ridged — **Platythyra** (1 species)
13. Stigmas more than 7 — 14
    Stigmas less than 7 — 15
14. Day-flower; outer petals yellow, inner red — **Hymenogyne** (1 species)
    Afternoon-flower; all the petals yellow — **Carpanthea** (1 species)
15. Cells of the fruit with a roofing membrane — **Stigmatocarpum** (3 species)
    Cells of the fruit open — 16
16. Ovules attached to the centre — **Cryophytum** (2 species)
    Ovules attached to outer wall .. .. — **Cleretum** (2 species,

L. Bolus.

EXPLANATION OF PLATE IV.

I. Forms of flower, shapes of receptacle, set of stamens, forms of ovary-top with nectaries and stigmas.

A. *M. albatum*, L. Bolus Fig. 1, flower with centre raised by the long and clustered stamens, surmounted by 8 slender stigmas, turbinate receptacle, and densely arranged petals in several series; 2, a section of the same, showing flat ovary-top and ovules attached to wall.

B. *M. auratum*, Sond. Fig. 1, a newly opened flower with a dipping towards the centre; 2, a section showing the receptacle prolonged into a tube, petals united at base and the staminodes and stamens attached to them, with a nectary-depression at the base of the latter, ovary-top convex, and stigmas subulate. Note the large papillae which glisten in the sun, giving the name of "ice plants" to the "papillose" species.

C. *M. leptaleum*, Haw. Fig. 1, a flower with clustered stamens surrounded by staminodes; 2, ring-like nectary, ovary-top cone-like, and 5 slender stigmas.

D. *Psilocaulon arenosum*, L. Bolus, with nectary-depressions, raised ovary-top and 4 slender stigmas.

E. *Erepsia inclaudens*, N. E. Bd., illustrates a flat flower with stamens entirely hidden.

F. *M. maritimum*, L. Bolus has loosely arranged stamens.

G. *Piquetia Pillansii*, N. E. Br. The section shows the very minute stigmas, concave ovary-top, receptacle produced into a cup, incurved stamens and staminodes, and the very distinctive clawed petal.

H. *Delosperma* sp. shows 6 separate nectary-glands and 6 subulate stigmas.

II. Forms of petal, stamen, stigma, and fruit.

A. Figs. 1—4 illustrate petals of *M. albatum*, *M. Marianae*, *M. maritimum*, and *M. mustellinum*. Note the rule is a narrowing towards the base except in the case of the thread-like petals (4).

B. Stamens showing glabrous and papillate filaments.

C. Broad stigma of *M. croceum*, Jacq.

D. Figs. 1—2, *M. purpureostylum*, L. Bolus, whose stigmas have long purple papillae.

E. Indehiscent fruit of *Carpobrotus Fourcadei*, L. Bolus, with the remains of numerous stigmas and the 5 persistent sepals.

F. *Conicosia pugioniformis*, N. E. Br. Fig. 1, a fruit, showing the full extent to which the valves open when wetted, and the deep, cup-like receptacle; 2, a section through the fruit showing the deep cell and the position of seeds low down on the wall, and the absence of a roofing membrane; 3, inner view of a valve with the 2 membranous wings; 4, rounded and smoothly polished seed.

G. *M. procumbens*, Haw. Fruit whose lobes are strongly compressed laterally, giving the summit a castellated appearance. Note the cup-like receptacle.

H. A tuberculated seed with a cresting round the margin.

III. Forms of fruit.

A. *Hymenogyne glabra*, Haw. Fig. 1, fruit, with withered remains of style and stigmas, beginning to divide into segments at the top; 2, the empty receptacle; 3, one of the winged segments, showing the side with the spinules: the other side, towards which the wing is directed, is more convex and almost smooth. The membranous area at the base often has a perforation, as shown in the figure; 4, the very smooth and polished seed, the dotted line indicating the inner outline of the embryo curved round the albumen; 5, a transverse section of seed with the cotyledons on the left, radicle on the right, and the albumen between.

B. *Skiatophytum Tripolium*, L. Bolus. Fig. 1, portion of expanded fruit, showing the short valves pressed close to, and not reaching beyond the apex of the receptacle; the broad horny keels, contiguous except at the apex, extending to the margin of, and pressed close to the valve; the seeds attached to the outer wall; and a complete absence of roofing membrane; 2, section of fruit, showing its unusual depth and placentation extending most of the way down; 3, seed, rough and almost black.

C. *Carpanthea pomeridiana*, N. E. Br. Fig. 1, portion of expanded fruit whose elongated valves extend far beyond the receptacle. The roofing-membrane is seen parting down the middle, and seeds are emerging through the gap as well as through the usual opening; 2, section showing seeds attached to the floor of the cell, corky outer wall, and unusually large central axis which is also corky.

D *M. procumbens*, Haw. Fig. 1, portion of expanded fruit with the keels diverging upwards and rather large membranous wings attached to them, a roofing membrane, and a small tubercle situated rather low down in the mouth of the cell, as shown in fig. 2, a section of the fruit; 3, pear-shaped seed.

E. *Aridaria trichotoma*, L. Bolus. Portion of fruit with seeds attached to central axis, absence of roofing, and inflexed valve-wings.

F. *Odontophorus Marlothii*, N. E. Br. with toothed keels ending in a fine point as do the membranous valve-wings. A large tubercle closes the mouth of the roofed cells.

G. *Apatesia* sp. with seeds attached low down on the wall and no roofing-membrane. The keels appear to be flattened on the valve and to extend very slightly beyond its margins, being almost contiguous in the middle of the valve; 2, a seed

IV. Forms of leaf.

A. *Carpobrotus* sp. with large triangular leaf; 1, section.

B. *M. spiniforme* with round-backed leaves hooked at the apex; 1, section.

C. *M. cordifolium*, flat leaf; 1, section.

D. *M. clavifolium*, illustrating a terete leaf, tapering downwards.

E. *Ruschia uncinata*, illustrating short leaves, sharply toothed on margin and keel. In this type the leaf-tissue extends almost to the next node, giving the appearance of a long sheath.

F. Two pairs of leaves illustrating heterophylly, the lower pair united into a bead-like form, differing markedly from the elongated upper pair.

G. *Cheiridopsis* sp. where the lower pair has a much shorter sheath than the upper pair.

H. *Ruschia sp.* A branch at rest, the next year's growth entirely enclosed by 2 pairs of hardened white leaves at the base of which are the persisting dried leaves of the previous year's growth.

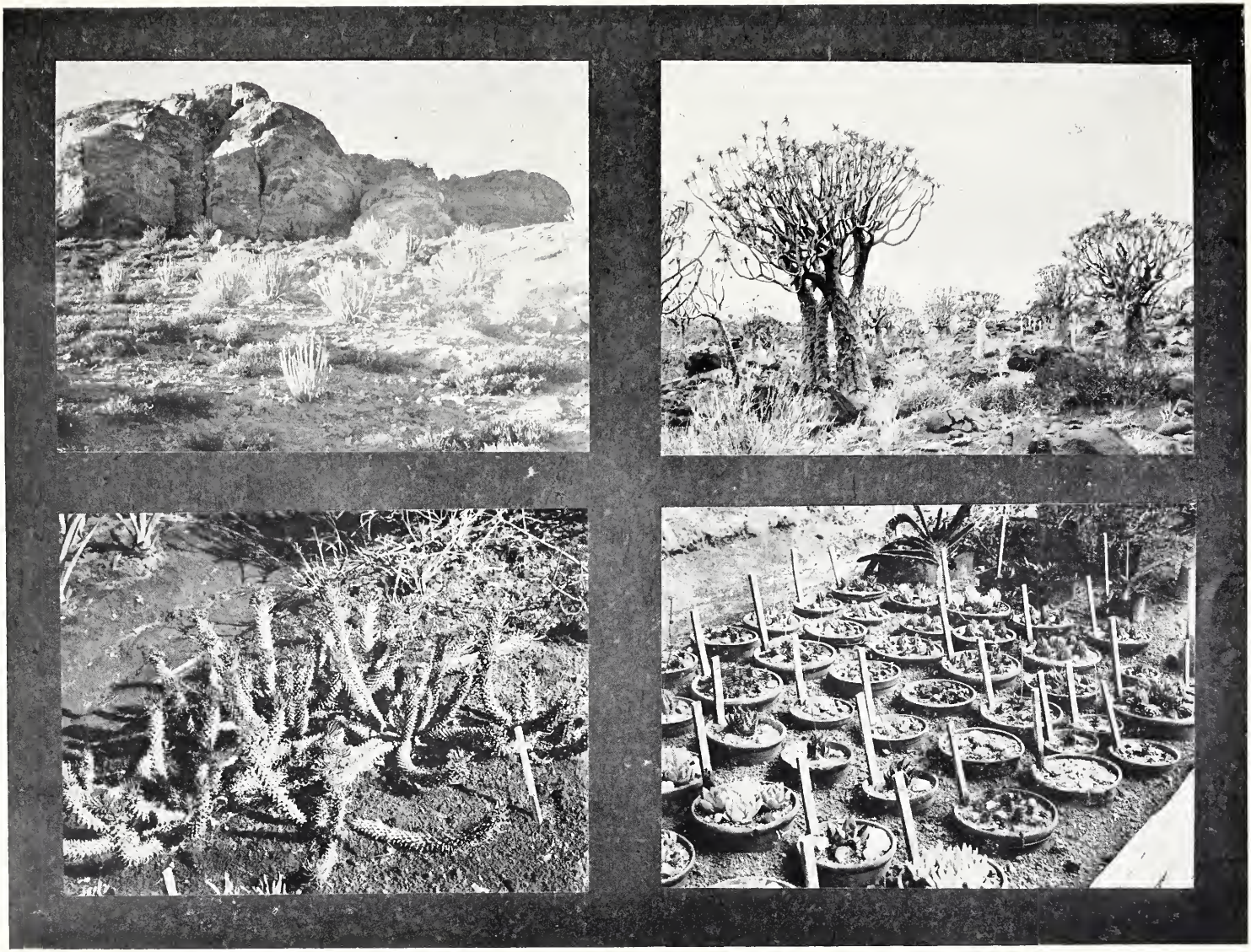

Photo R. H. Compton.

PLATE V. 1. Euphorbia Dregei at Haalenberg. 2. Aloe Dichotoma at Kokerboom, S.W.A.P.
3. Euphorbia Caput-Medusæ at Kirstenbosch. 4. Haworthias at Kirstenbosch.

South African Succulents.

IN garden phraseology a Succulent Plant is a plant with fleshy leaves or stems, or both. They are natives of the arid regions of the world, with the headquarters of the Eastern Hemisphere in South Africa, and of the Western Hemisphere in Mexico. The most outstanding feature of the Mexican succulents is the remarkable spines clustered on the stems of Cactaceae, of which a good example is the "Prickly Pear." This spiny character is present only in comparatively few of our plants, such as some of the Aloes, Euphorbias, Pachypodiums, etc., and in most of these are less numerous and less formidable in character. The order Cactaceae is composed entirely of succulents of which we have only one member native of the Union, a species of Rhipsalis found in Natal. This plant, curiously enough, is a shade-demander, and pines away in full sun. It is also a humiphyte, living on organic matter, as leafmould. It is possibly also partly epiphytic. The general features of the succulents of these two regions are very distinct, but reach their nearest resemblance in the Mexican Agaves and Furcraeas of Amaryllidaceae with the South African Aloes of Liliaceae. Although all Cactaceae are succulents, all succulents are not Cacti or Cactuses, but belong to numerous and varied Natural Orders.

In South Africa the Natural Orders containing genera with the most numerous and outstanding species are:— Liliaceae with its Aloes, Gasterias, Haworthias, etc.; Ficoideae with its Mesembrianthemums, now being split up into many new genera; Euphorbiaceae with its many and varied Euphorbias; Crassulaceae with its Crassulas, Rocheas and Cotyledons; and Asclepiadaceae with Stapelias, Ceropegias, Huernias, Hoodias, Tavaresias, Trichocaulons, etc., etc. Orders with only a few representatives are Geraniaceae, with Sarcocaulons; Vitaceae, with Cissus; Compositae, with Senecios and Kleinias; and Portulacaceae with Anacampseros. Within these genera are plants ranging from the tree Euphorbias and Aloes of 50 and 60 feet down to the little dots of about 1/12th of an inch in the Conophytums. The genera richest in species are Mesembrianthemums, Euphorbias, Crassulas, Aloes and Stapelias. Most other genera have several species, but a very few are monotypic. A few only are sweetly fragrant as found in *Mesembrianthemum caulescens*, and in *Crassula jasmini-flora;* but for unapproachable malodorousness the Stapelias or Carrion Flowers are hard to beat. For dainty dazzling shimmering brilliancy of colours the Mesembrianthemums are not surpassed, if even equalled, by any other genus throughout the world. Variation in form and colouring reaches its highest in the Mesembrianthemums and Euphorbias, and quaintness of form of flower reaches its climax in the parachute-like flowers of the Ceropegias. The podgy bloatedness of the stems of the Trichocaulons, and the leaves of many Mesembrianthemums are irrestible to all novices — they must squeeze or pinch them — I wonder if it is to see if they will squirt or squeak!

From the foregoing it will be seen that extremes are reached in many directions in the plants under review. And in many directions also they provide entrancing studies to the enthusiasts, as well as to the gardener in their cultivation.

Fairly comprehensive collections have been cultivated in various countries of Europe for the last century, and enquiries are now received from other continents. In this country, before the institution of Kirstenbosch, their cultivation was confined to a few enthusiasts and botanists. Now their cultivation is general amongst private individuals and public institutions. South Africa has for long been mostly looked upon as a country of succulents, yet no country has provided more flowering material for the advancement of decorative gardening throughout the world, and there is more, much more, of this class of material available.

To obtain a perfect knowledge of the requirements of every individual succulent plant would entail much travel and years of study. The main requirements are a dry atmosphere, and a limited moisture at the root. Given control of these their cultivation is a simple affair. The next point upon which a clear knowledge is essential, is, when does a particular species make its growth, or, conversely, when does it rest? There are no text-books we can turn to as a guide to their cultivation in the Peninsula. So that we are left to deduce their requirements from our knowledge of their geographical distribution, and the climatic conditions pertaining to the localities, or regions. On these lines we can divide the succulents into two groups. The one, native of the regions under summer rainfall; the other, native of the winter-rain belt. Roughly, the winter-rain belt may be said to lie along the coast from South-West Africa to or beyond Humansdorp in the East, and widening out from the coast to the various mountain ranges

bordering the Karoo. To the north of these mountain ranges is the country of the summer rains. There are, no doubt, areas along or through these ranges where the meteorological conditions of each side overlap, and create a third set of conditions, but which may be ignored at the present time.

All succulents have a period of growth followed by a period of rest. So that the first step in their cultivation is to divide them into these two groups; the one growing in winter and spring, and resting in summer; and the other growing in summer, and resting during our winter. As the Peninsula has the heaviest rainfall of any part of the winter-rain belt experience alone can teach us how many, and which winter succulents can withstand our rains. In actual practice it has been found that the stronger succulents like the Tree Euphorbias and Aloes withstand admirably the supposed drawbacks of the Peninsula winters, whether they are natives of the summer-rain or the drier parts of the winter-rain areas. At the present time it is safe to say that 90 to 95 per cent. of our succulents will be satisfactory under open air conditions, and as we pass from the Peninsula northwards with a gradually lessening rainfall the more easily will success be secured.

It is also certain that as parent plants are safely established, and seed is secured, so will the progeny become more quickly acclimatised.

At the present time the foundation of a collection has to be made mainly with plants uprooted from the wild. As a rule these are not difficult to establish, and if a permanent site is ready they can be planted immediately during summer, and an occasional watering given to help them along. The exceptions are found in Stapelias, Trichocaulons, Hoodias, Tavaresias and such as are almost solely made up of "pulp" with little fibre to strengthen them. A ruptured skin, or flesh damaged by the slightest shaking always results in their loss. Fortunately in the case of Stapelias, and less so with Tavaresias, the sound parts can be made into cuttings and will root freely, but not so the others, which can only be increased from seed.

Many of the succulents are readily increased by suckers, by division, or by cuttings. It should however be noted that few Euphorbias reproduce true plants from cuttings of the branches. In the case of the tufted species like *Euphorbia caput-medusae* the branch cuttings will root occasionally but will not make perfect plants with central stems: they will continue growth from the tip only. Branch cuttings from the Tree Euphorbias will root readily and develop correct growths from the lateral axils, which, when large enough, can be taken off and rooted to secure perfect plants. A safe practice is to dust the cut ends with dry sand to stop the flow of milk, and lay them out for a dry skin to form before potting or planting out. Gasterias and some Haworthias are rapidly increased from the leaves, cut off near the base, and laid at an angle so that the cut end is just covered with a light sandy soil, a large number of growths are produced that can be taken off and rooted. If left on the leaves to form decent plants the number of growths secured is reduced. *Rochea falcata* and *R. perfoliata* and some Cotyledons can be increased in the same way. While several Crassulas produce plantlets on the flower stalks, in other Crassulas, and some Mesembrianthemums, the tips of the branches are "cast" during the dry period and root freely on the advent of rain. The shrubby and trailing Mesembrianthemums are readily increased from cuttings of young growths. The compost for rooting in should be about equal parts of sand, leafmould, and red soil with a layer of dry sand on the surface. The best time for vegetative propagation generally is during the summer for outside work, as the slightly moist condition required, with warmth, is then most easily secured. For a large number of the showiest flowering shrubby Mesembrianthemums their increase is most easily secured during April and May with the advent of rain but can be carried out at other times with attention to watering.

For the generality of tree and shrubby forms of succulents a permanent site in the garden is best secured on a well drained slope, natural kopje or hillside rockery facing north-east or north. Failing a naturally favourable site, a raised rockery could be made, and in many ways would be most advantageous, as in its construction special places could be made to meet the particular needs of individual plants. The best soil is an open, sandy, or gritty loam, fairly rich. In planting, the soil should be firmed down from the bottom of the hole to the top, in order to secure a rapid run-off for heavy rains. Stones of all shapes and sizes can be worked into the surface soil to assist in the prevention of saturation. Not only does a loose soil become water-logged, but where it remains dry it induces a too rapid growth, altering the whole complexion of the plants. with loss of flowers. Short sturdy free-flowering growth is the very essence of the attraction of the larger succulents, and this can best be secured on gritty loam well compacted and packed with stone. It is most satisfactory to reserve an area solely for succulents and their associate plants and not to mix ordinary free growing "garden" plants with them even discriminatingly.

The above forms of succulents are found in those parts of both regions where a decent rainfall or soil moisture is

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PLATE II. MESEMBRIANTHEMUM AND ALLIED GENERA.

1. Conophytum wettsteinii, N. E. Br.
3. Gibbaeum pubescens, N. E. Br.
2. Oophytum oviforme, N. E. Br.
4. Dinteranthus Margaretae, Schwantes.
5. Didymaotus lapidiformis, N. E. Br.

Mesembrianthemum and Allied Genera

PLATES II AND III.

Several genera recently separated from Mesembrianthemum are illustrated here, and all of them in colour for the first time. They are typical xerophytes with their clustered or closely crowded branches and branchlets, and they are all of the low-growing type. A mere glance at each example will show how significant a part is played by the leaves in all of them. For not only do these organs serve as storage-reservoirs for the plant, but their size, shape, colour, as well as their set and densely packed arrangement, give in every case a very distinctive appearance to the individual as a whole. If we add to these characters two others — namely, the relative size of the two leaves forming a pair, and the extent to which these two are united — we may accompany Dame Nature once more in her progress along one or other path until it leads us, as do all her paths, to the brink of infinity.

Among shade-plants, like ferns for instance, and in marsh-plants, like Arum, we are familiar enough with the "frondose" type of growth, where stems and branches are hidden, and the development of the leaves into so many beautiful and graceful forms has won such universal admiration. Equally fascinating, although so very different in almost every respect, are what might justifiably be called our frondose xerophytes, notwithstanding the rigid economy displayed in those numerous examples where not more than one pair of leaves is allowed for each branchlet.

1. Conophytum Wettsteinii, N. E. Br. is a good example of the "cone-plants," a genus remarkable for the manner in which a pair of leaves is closely welded to form a solid body except for the internal groove within which the flower-stalk and bud are situated, and a narrow opening through which the bud emerges. This particular species belongs to a section of the genus whose growths or "bodies" are smooth and unspotted on the surface. The bodies are shown in various stages of development — one entirely enclosed in its summer over-coat, and the rest preparing to throw it off preparatory to their autumn and winter activities. On the left still later developments of the current year's growth are given, from the time the bud first pushes through the orifice left by the otherwise welded leaves, till the flower is fully open. The ovary is enclosed in the body, but the calyx with its long tube is exserted. The yellow corolla-tube is visible beyond the sepals; and the rose-coloured petals, which are numerous for the genus, are arranged in about 3 series as to their length, and expand throughout the day, reaching a spread of 1¼ inches. Most of the yellow anthers are seen exserted from the throat of the corolla.

The plant depicted was sent to Kirstenbosch (N. B. G. $\frac{2252}{17}$) from near Ookiep by Miss Phillimore and flowered in April 1918.

2. Oophytum oviforme, N. E. Br. is the only species in the genus so far as is known at present. One is not surprised to learn that, in the absence of perfect flowers, its botanical existence began as a *Conophytum*, seeing how similar the egg-shaped bodies are in their general build to those of the latter genus. The orifice, however, is relatively larger and tends to be gaping, and the bracts are exserted with the flower. Other differences, which occur in the flower itself, are the herbaceous calyx and the separate petals with the stamens unattached. The original of the drawing was sent from Ookiep by Mr. Good to the National Botanic Gardens (No. $\frac{1652}{24}$) where it flowered soon afterwards. The painting was made before the "bodies" had time to lose their sunburn-glow. They became greener later.

3. Gibbaeum pubescens, N. E. Br. This is one of the old species, grown in England before 1795 when it was published, thus being the earliest known species of the genus. The name alludes to the silvery pubescence which clothes all the herbaceous parts. The original of the painting was collected by Professor Compton (N. B. G. $\frac{1152}{24}$) near Barrydale in flower, and was drawn at once. Four branchlets in full growth are depicted each having its pair of unequal leaves united a long way up, and its solitary flower terminating the current year's growth. The next year's branchlet is seen developing from the axil of one of the leaves of each leaf-pair. Lower down are the remains of previous years' leaves.

Gibbaeum is composed of about 11 species, natives of the Kleln Karroo and especially of the Ladismith Divlsion.

4. Dinteranthus Margaretae, Schwantes was sent from Warmbad in South-West Africa to Kirstenbosch (N. B. G. $\frac{467}{24}$) by Dr. Dinter, after whom the genus is named. As the plants flowered in May of the same year, the artist was able to portray them almost exactly as they would appear in their natural surroundings and before being affected by cultivation. All the leaves were somewhat wrinkled and strongly marked on the angles with a yellowish line. The floral structure is similar to that of Rimarla, but the branchlets are usually provided with three pairs of leaves — all, apparently, functioning equally.

5. Didymaotus lapidiformis, N. E. Br. This very distinct-looking plant, so exactly answering to its name of the "stone-like twin-flower," was discovered in the Ceres Karroo by Dr. Marloth who describes the leaves as being in nature "of a brownish-red colour and closely resembling the angular pieces of brown shale and sandstone between which the plants grow." One can easily realize how difficult it must be, without flowers to locate plants which are in such complete harmony with their surroundings. The painting was made from one of several plants sent by Mrs. Wrentmore, which flowered at Kirstenbosch (N.B.G. $\frac{292}{17}$)

6. MESEMBRIANTHEMUM TUGWELLIAE, L. Bolus is named after its discoverer, Mrs. Tugwell, who sent it to Kirstenbosch (N. B. G. $\frac{44}{14}^{39}$) in the early days when a "Mesemb." was a "Mesemb." and nothing else. But nowadays our species will have to find a genus other than *Mesembrianthemum*, as the accompanying drawing of an expanded fruit with its prominent white tubercles clearly shows. This point, however, is of minor importance compared with the interesting leaves and the unusual amount of variability in their shapes. All idea of symmetry seems to be abandoned in favour of one of mutual accommodation. For one leaf is provided with exactly the depressions and protuberances into which the corresponding protuberances and depressions of its neighbouring leaves will fit -- a delightful example of how sharp angles may be softened and worn down, and rigid lines curved, all for the general good of the body politic. In times of prolonged drought the amount of protection which one leaf affords another may be a matter of life or death.

The plant drawn is straight from the veld at Prince Albert, on practically the same spot as the type grew, and was received in flower in June, 1920.

7. PUNCTILLARIA SORORIA, N. E. Br. This genus is so-named on account of the large dots or punctuations which roughen the surface, and, being dark green, are conspicuous on the greyish ground-colour of the leaves. The latter have a tendency to be upright or nearly so, thus presenting the least possible amount of their surface to the midday sun. Each branchlet, or year's growth, may consist of two pairs of leaves, the lower in various stages of withering and the upper pair "on duty." The gorgeous golden flower, on a short peduncle with a pair of bracts arising at its base and reaching to the calyx, opens in the late afternoon and evening. The presence of a peduncle distinguishes this species from the rest of the genus, which have sessile flowers. The painting was made from plants which flowered in Dr. Marloth's garden.

8. LITHOPS PSEUDOTRUNCATELLA, N. E. Br. This picture will have a special interest for many members of the Botanical Society: it represents a plant collected by Dr. Pearson on his last visit to the Karas Plateau in South-West Africa in 1916, the year of his death. With the exception of the "earth-coloured stone-face (*Lithops terricolor*), which occurs in the Karroo at Laingsburg and Miller, all the known 19 or 20 species of *Lithops* are recorded from the North — Prieska, Griqualand West, and, far and away more than anywhere else, in South-West Africa. The painting was made in Jan. 1918 when the plant flowered at Kirstenbosch (N. B. G. $\frac{161}{16}$).

9. GLOTTIPHYLLUM sp. The "tongue-leaves" are as easily grown in cultivation (apart from the ravages of snails and other hungry creatures!), and as easily recognized generically as they are difficult to divide into species with satisfactory limits. This accounts for the absence of a specific name to the plant represented here. The large, sessile flower, however, and the 2-ranked leaves indicate the affinity as being with *G. grandiflorum*, N. E. Br. The original of the painting was collected by Miss Arbuthnot at Montagu Baths and flowered at Kirstenbosch (N. B. G. $\frac{1220}{16}$) in May 1923. Montagu is a good centre for *Glottiphyllum* which, avoiding the actual coast, extends eastwards to the Albany and Alice Divisions and westwards to the Caledon and Bredasdorp Divisions.

L. BOLUS.

PLATE III. MESEMBRIANTHEMUM AND ALLIED GENERA.

6. Mesembrianthemum Tugwelliae, L. Bolus.
7. Punctillaria sororia, N. E. Br.
8. Lithops pseudotruncatella, N. E. Br.
9 Glottiphyllum sp.

regular in its season. These are therefore not too difficult of cultivation in the Peninsula.

The real difficulties are encountered in those plants from parts where only a light rainfall is the rule and where often they are subject to prolonged drought, in some cases lasting for years, and resulting in even succulents dying off wholesale. Such results are not desirable in gardens. So that some moisture must always be present to prevent loss. In a garden plants should be in a healthy condition at all times, even when at rest. It is therefore essential that both extremes are avoided, and the amount of moisture during the growing stage, as well as when at rest, controlled to a nicety. Here comes in the necessity to separate sharply into two groups, the one group resting in winter, the other in summer. The plants of the group resting in the winter are mainly from the Cape Midlands, the Great Karoo and thence North Westward, Northward and Eastward including the greater part of the South West African Protectorate, Bechuanaland, Transvaal and Orange Free State and the drier parts of the Eastern Cape Province. The plants of the other group come from the South Western corner of the South West African Protectorate, Little Namaqualand, the Van Rhynsdorp, Calvinia, Clanwilliam and Ceres Divisions, the Western Karoo and the Little Karoo. The two groups are alike in that an excessive amount of moisture is not only detrimental to their well-being, but is generally fatal. So that in their cultivation the first essential is protection from heavy rains during our winter. The readiest means to this end is a glass house, which may have open sides, or built-in sides with the upper half of wood and glass. Plenty of ventilators on the roof and along the sides are necessary, as the aim is not to conserve heat, but to keep off heavy rain, and a free buoyant atmosphere is desired. Shelter of course can be most economically secured for the winter resting ones by glass lights, or even a corrugated iron shed with the sides open, as the pots can be stacked on either side in tiers. For those growing during the winter a glass house is the ideal until such times as they acclimatise, or a complete knowledge is gained of the methods securing success in the open air.

It is anticipated that raising plants from seeds will secure the speediest hardening to local conditions. Under glass the results are certain with correct treatment. Staging of corrugated iron covered with two or three inches of clean shingle will provide good drainage under the pots and retard too rapid evaporation. The production of seeds is prolific in the main. The very fine seeds of the winter growing ones such as the many new genera of the "Spheroids" should be sown about March, and the summer ones about September. Pots are preferable, but tins may be used. Both should be well crocked for drainage, and a thin layer of moss placed to keep the soil from choking the crocks. A sandy soil, made up of equal parts of sand, leafmould, and red soil or a granitic soil, well mixed, and passed through a ¼-inch sieve should be used. Fill up, and firm down the soil to half an inch below the rim, level the surface and sow thinly, sprinkling a little dry sand on the seeds, more to hold them steady than to cover them. The soil used being nicely moist, a spraying with a syringe will be all the watering required for some days. On account of overhead watering moving the small seeds about, the pots, when dry, should be stood in a few inches of water until the moisture has risen to the surface of the soil. This method should be continued until germination takes place, when watering with a fine rose can be started. As soon as the seedlings are large enough to handle they should be pricked off, an inch or so apart, into other pots or tins according to the numbers or the purpose required. The very tiny species, such as in Conophytum, will take a year and longer to reach the stage for pricking off. The larger seeded species and growers as in the Aloes, Gasterias, Euphorbias, Cotyledons, etc., are much quicker in their growth, and can be treated more in the ordinary way, provided that at no time should the soil become water-logged. From the pricking-off stage to the flowering stage of the Spheroids the treatment will consist of watering. Whether to water or whether to withhold water will be the crucial questions. Must the seedlings be rested or dried up during the period it is essential the mature or full grown plants should be dormant or at rest? Or must they receive sufficient moisture to "keep them on the move"? It is certain that under the natural conditions of these plants seedlings die wholesale even under their normal rainfall. And garden practice, especially in bulb culture, teaches that seedlings will reach their flowering stage the quickest by keeping them growing as long as they will grow; and the growing period can be very much prolonged by attending to their wants. It is certain there is nothing gained by submitting seedlings of these plants to a dried-out condition. Rather keep them just plump by supplying a little water, just sufficient to prevent actual shrivelling. Whether a light shade is preferable to watering at this period has yet to be proved. When the seedlings have reached full size, with their store of nourishment, they can withstand a prolonged rest, and thereafter be given the treatment of adult plants. The fleshy parts of these plants function above ground exactly as the fleshy parts of "bulbous" plants function underground.

It will be interesting to note some striking exceptions to the accepted conditions for succulents generally. There are quite a number to which direct sun is detrimental, and these can be readily recognised by the transparent or glassy appearance of their leaves. Examples are found in several species of Aloes. Haworthias. and Sphaeroid Mesembrianthemums (the Window Plants). The extreme is reached in *Bulbine mesembrianthemoides* and *Haworthia Bolusii*. The leaves of both are underground with the exposed tips always shrivelled, and if not covered in potting, or if further exposure occurs the shrivelling continues to ground level. The Window Plants (Frithia and Fenestrarias) and the Haworthia are found with a surface layer of an inch or two of sand shading the leaves from the sun. The Sphaeroids, like Lithops, are underground with only the flat top exposed at the level of the ground, the surface soil being usually sandy or gritty decomposed granite. The Conophytums grow in the weathered hollows of granite boulders which may be even along the banks of rivers, and in but little soil made up of their own humus and what sand, etc., is added by the wind. Often they are more or less attached to the rock, and the dried out body each season forms a shell controlling evaporation and shading the plant during the hot dry resting season. A few like Gibbaeums and Muiria are partial to a stiff clay soil.

Aloe haemanthifolia is confined to moist places, and *A. Cooperi* and similar species are partial to moist alluvial soils of valleys or grass lands. *Crassula multicava* is at its best only in shade, and *Aloe ciliaris* and other species of both genera benefit greatly from partial shade. The Gasterias, as a whole, are only at their best if protected from strong sun, the ground colour and marbling of the foliage being charming under light shade. These plants, and most of the Cotyledons, well repay good treatment. A rich loamy soil and a steady supply of moisture the year round will work wonders in foliage and flowers.

The strongest light-green stemmed Stapelias, as those from the Transvaal, revel during the summer in a rich loamy soil with liberal watering. They make very quick growth and flower freely on the new stems. They should be placed in their winter shelter about April, and taken out about October and repotted or tinned or planted out in a compost of equal parts sand, leafmould, red soil or granite soil, and well decayed dairy manure broken fine. Cuttings of single stems root readily at this time, and make good plants by the end of the summer. As with all succulents, allow the cut surface to dry over before inserting in the soil; and keep the soil just moist until roots are formed, when the supply can be gradually increased.

Where sufficient space is not available under cover for winter-resting plants ill effects are alleviated by tilting the pots sideways with the plants towards the north, where full sun is secured to dry up moisture. The tilt of the pots should be such that water is not held up by the pots or tins. About October they can be re-plunged in open beds up to 2 inches from the rim, when watering must be regularly attended to for the growing period.

When the winter-flowering species have completed their growth, usually by October, they can be transferred to the open, plunged in beds, and left to rest. If rain falls the pots, etc., can be lifted, slightly turned, and dropped in again, and the soil will dry out quickly. After continuous heavy rains this plan of moving the tins or pots on the first fine days will lessen the ill effects, and often obviate them entirely, on all classes of plants and seedlings.

On the removal of the winter-flowering species to the open the inside space can be used for the raising of summer flowering or growing species from seed and cuttings. The two systems required fit together well and enable work to become routine.

How can we be sure of the growing or resting seasons of particular plants if the natural localities are not known? Only by a close watch for any change in the plants. Signs of growth or flowering usually begin in its natural season, and as soon as seen, no matter how minute, watering must be started and continued, at least until the seed capsules are full grown and ripe. I am inclined to think that in Conophytums development of flowers is the first sign of activity, and the renewal of the sphaeroidea, or fleshy body, is only completed after the seed is ripe. However, more study is required.

The cultivation of succulents is in its infancy and new species are continuously being collected, and the life history of many is not yet known. To the student they will form an absorbing study, providing new and changing interests the year round: to the cultivator, the added possibilities of a commercial proposition. Cultivation is not transferring a wild plant from one part to another. Cultivation is the raising and growing of new individuals, and calls for a keen interest and well developed powers of observation and deduction to secure progressive results.

J. W. MATHEWS.

Kirstenbosch,
November 1927.

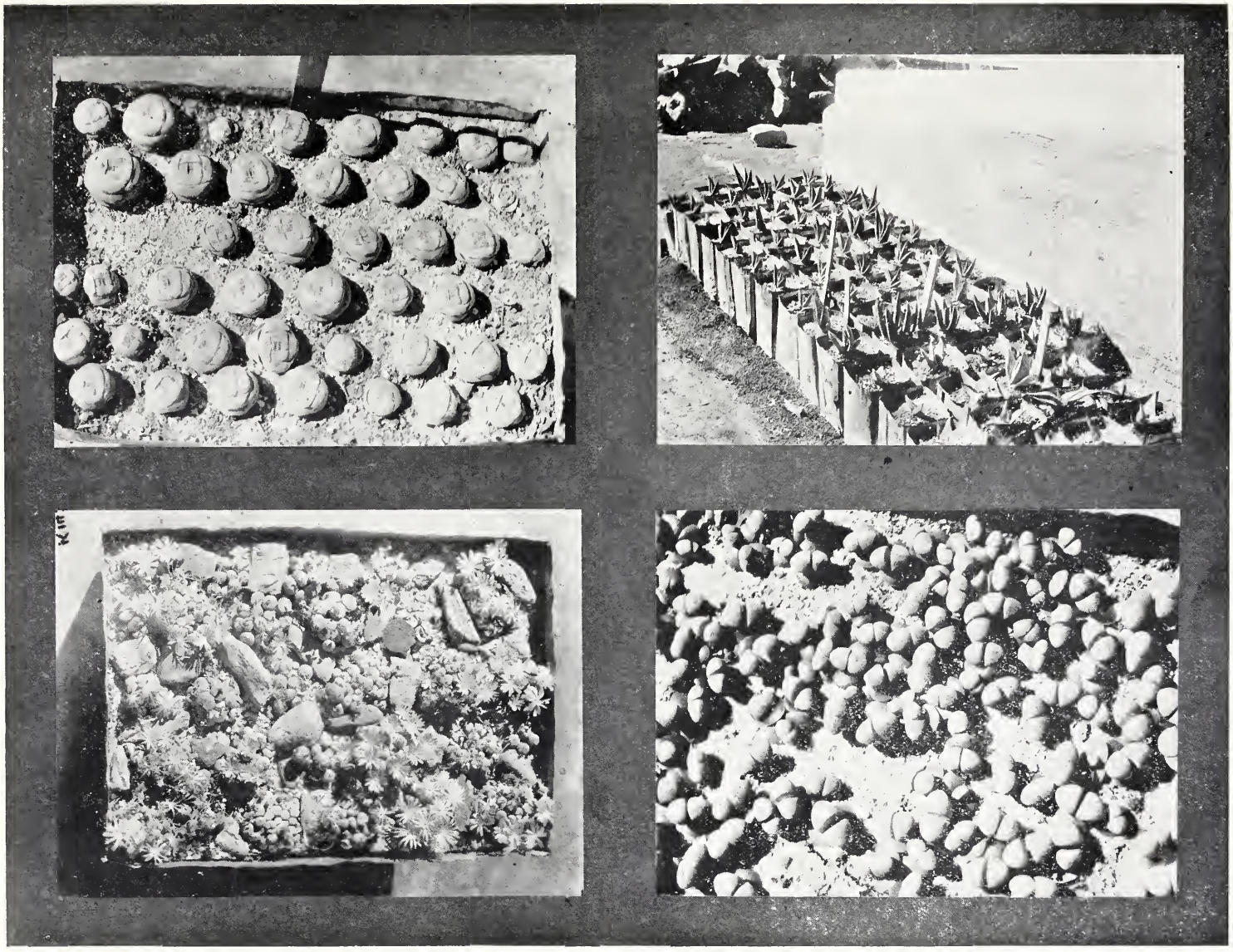

Photo R. H. Compton.

PLATE VI. CULTIVATION OF SUCCULENTS AT KIRSTENBOSCH.

. Crassula Columnaris. 2. Seedling Aloes. 3. A Conophytum in Flower. 4. Pleiospilus Bolusii, N. E. Br.

Alien Trees at Kirstenbosch.

WHILE many aspects of the varied flora and natural beauties of Kirstenbosch have been dealt with in articles in this Journal, there is one side that has not received very much attention. This is the side concerned with those plants that are found growing there which are not indigenous and yet which have not been planted as part of the collection in the National Botanic Gardens.

Kirstenbosch as a botanical garden was established in quite recent days, long after the ground it occupies had been altered and modified in many ways from its primaeval condition. Among other alterations that had occurred was the planting of trees of various kinds. This tree-planting was carried out for many reasons, commercial, domestic, and aesthetic. The indigenous forests on the lower slopes of the mountain were destroyed in the very early days by the settlers who required timber for firewood, building, and other purposes.

A notorious feature of our native trees and forests is their extreme slowness of growth. When the early colonists were faced with a shortage of timber in a land with very limited natural forests, they planted rapidly growing trees from other lands in preference to the slow growing native forms, even though the timber may have been inferior.

Another factor contributing to the planting of trees is found in the very strong conservatism of man: in his new home he wanted the surroundings he was used to.

Kirstenbosch as a garden inherited quite a full share of these foreign trees, brought from whatever cause may have operated. Yet few will feel that the unique features of Kirstenbosch lose anything from the presence of these alien plants. Oaks, pines and gum trees form no part of the indigenous flora of South Africa, yet they play a definite part at present in the picture presented to those entering the Gardens. Who would prefer to see Kirstenbosch denuded of all the foreign trees? without the oaks on the Lawn or about the Tea House? without the stone pines on the Aloe Kopje?

The transportation of plants to countries where they did not grow naturally is creating a problem of ever increasing importance to botanists. Wherever civilised man has settled he has taken with him plants from his original country and elsewhere. Food-plants, timbers, ornamental plants, are taken everywhere. These and many others are brought deliberately, but in addition there are many others that have arrived accidentally: these are the weeds, many of which have now attained a world-wide distribution. It is not intended at present to enter into any discussion on the immense variety of the introduced plants in this country or of their sources or means of arrival. Some of the trees and shrubs that are aliens which are commonly found growing at Kirstenbosch will alone be mentioned.

Of all the trees at Kirstenbosch the most conspicuous and the best known is the Oak (*Quercus robur*). This tree needs no description. Oaks were introduced into South Africa from Europe in quantity by Van der Stel in the latter part of the seventeenth century and have flourished exceedingly since then.

In South Africa the oak grows at a very much more rapid rate than in its northern home, but this rapid growth is attained at the expense of the quality of the timber. In Europe oak wood is proverbial for its strength and durability: the timber of South African grown trees is soft, coarse-grained and of little value.

The oak trees produce enormous quantities of acorns but in this country the tree does not spread at all rapidly from self-sown seed. The vast majority of the seedlings are killed by drought before the young plants can become established.

The oak, in contrast to most of the indigenous trees, casts its leaves in winter. Several other deciduous trees are found at Kirstenbosch. One which is nearly allied to the oak botanically is the Sweet Chestnut (*Castanea sativa*), some trees of which have been planted along the road through the Klassenbosch part of the gardens. There is an old and almost dead tree of the Sweet Chestnut near the Bath, and there are other more flourishing specimens at the old ruins at the top of the (Cape) Chestnut Avenue, which may date from the building of that house by Mr. Kirsten, or from its occupation by Colonel Bird. The Chestnut comes from southern Europe, from the countries bordering the Mediterranean. This tree has been cultivated for the sake of the fruits from the earliest times, and its real native home as a wild tree is still rather an open question. In summer this tree is easily recognised by the large elliptical leaves with sharply serrated margins; in winter, the thick twigs with prominent leaf scars which are not straight below the buds are distinguishing features.

The Grey Poplar, (*Populus canescens*) is another deciduous tree coming from Europe. This tree, with its

smooth grey bark and small rounded leaves which are covered by white hairs when they first emerge, is well known. The Poplar is a tree that reproduces very readily from suckers, that is, buds formed on the roots. Such suckers may form quite dense thickets. An example of this kind of growth is found on the path leading towards Skeleton Gorge. The Grey Poplar has the stamens and the carpels on separate plants. At Kirstenbosch, and as far as is known all over South Africa, the staminate tree only is found.

The Alder (*Alnus glutinosa*) is another deciduous European tree that is found along some of the streams here though not in any large quantity. The tree is easy to recognise from the rounded blunt-pointed leaves and stalked buds. A few other deciduous trees occur but not in sufficient numbers to warrant special mention. The Ash (*Fraxinus excelsior*) and the Silver Birch (*Betula alba*) can be seen in the old plantation at the top of Nursery Gorge.

The alien trees that retain their leaves throughout the year are more numerous. In a country where the winter is by no means severe and in which practically all the indigenous trees are evergreen it is not surprising to find that foreigners with this habit have been favoured. The evergreen trees include both flowering plants and gymnosperms. The latter have needle-like leaves and cones instead of flowers. The pines are the only gymnosperms that call for notice. Of these two are abundant at Kirstenbosch, the Stone Pine (*Pinus pinea*) and the Cluster or Maritime Pine (*Pinus pinaster*), while a third species *Pinus insignis*, though not occurring in Kirstenbosch, is abundant just outside. The first two, *P. pinea*, and *P. pinaster*, originate on the coasts of the Mediterranean and especially on the western part of it. *Pinus insignis* comes from the Pacific coast of the United States.

Like all pines these trees have elongated needle-like leaves; in *P. insignis* these are arranged in groups of three, in the other two in pairs. *P. insignis* has long needles which are a purer green in colour and not such a dark blue-green tint as the other pines. The twigs are rather thick. Some fine old trees of *P. insignis* occur along the Rhodes Road near the Fernwood gates. The stone pine and the cluster pine can be distinguished from one another by their habit. The former is characteristically umbrella-shaped with a flat or rounded crown while the latter is pointed or pyramidal. The cones of *P. pinea* are large, rounded and blunt ended, while those of *P. pinaster* are smaller, conical and pointed. The bark on older trees forms another easy means of differentiation; in *P. pinaster* the ridges between the furrows are narrow and often sharp edged while in *P. pinea* they are broad and flat. These flat ridges separating the furrows give the stem a much paler colour.

Both these Mediterranean pines spread rapidly from self-sown seed. The cluster pine especially has become completely naturalised and competes all too successfully with the native vegetation. At Kirstenbosch a considerable amount of labour is expended from time to time in checking the vigorous spread of this pine which, left alone, would soon dominate and drive out the indigenous bushes, as it has done on the lower mountain slopes above Cape Town.

Among the evergreen flowering trees at Kirstenbosch which have been introduced, the eucalypts are the most prominent. A belt of these trees extends across just above the cultivated portion of the garden. Eucalypts all come from Australia. In Australia, *Eucalyptus* is the characteristic tree and there are a very large number of different species which are in many cases by no means easy to differentiate. A Eucalypt as such is readily recognised however. The simple leaves with a single midrib and characteristic aromatic oils are most often pendent or on pendent branches. The flowers are most often white and have numerous stamens that spread out after the outer parts fall off. These outer parts come off in one piece like the lid of a box.

The eucalypts planted at Kirstenbosch are mostly tall trees belonging to many different species. Some of them come up freely from seed, but seedling plants rarely establish themselves, and the Gums therefore keep within bounds, unlike the Cluster Pine.

From Australia also come the various kinds of Wattle that are so frequently met with. All are species of *Acacia*. The flora of South Africa contains many species of this genus but none is indigenous to the Cape Peninsula. Four or five different kinds have been introduced however from Australia. One of these, *Acacia decurrens* (the Australian Black Wattle) has finely divided compound leaves and pale lemon coloured flowers. A group of trees of this plant occurs near the Tea House at the bottom of the Chestnut Avenue. The other Australian Wattles have what appear to be simple leaves, though in reality, what appears to be the leaf is the leaf stalk that has become flattened and expanded, and forms what is called a phyllode. The Blackwood (*A. melanoxylon*) frequently exhibits leaves in a state of transition between the full development as seen in *A. decurrens* and phyllodes. The Blackwood is a very dark green tree with rather thin phyllodes with several veins of equal size. The so-called

Port Jackson Willow (*A. saligna*) is a small tree with drooping phyllodes with one large main vein. In the flowering state this is probably the most beautiful of the introduced wattles. The commonest wattle is *A. cyclopis* which is a shrub rather than a tree. It has short erect phyllodes with many parallel veins and rather small flower-heads. The plant is readily recognised by its curled pods containing shining black seeds each of which has a red stalk that is curled round the seed. Another wattle occurring frequently at Kirstenbosch is *A. longifolia*. This also has phyllodes with many parallel veins but these are longer than those of *A. cyclopis*, more pointed and of a fresh bright green colour. The flowers are in cylindrical spikes, not in spherical heads.

Another Australian plant which is closely allied to the Acacias is *Albizzia lophantha* which has become exceedingly abundant at Kirstenbosch and can be found in almost any part of the gardens. It is especially abundant amongst the Silver Trees on the ridge above the Protea garden. This plant has large green finely divided pinnate leaves and flowers with many long stamens. The flowers are arranged along the stem in spike-like structures and not in heads as in *Acacia*. *Albizzia lophantha* comes from West Australia.

Another alien from Australia that has shown itself very much at home under South African conditions, is the Proteaceous plant *Hakea*. Some species of this genus have become rather rampant weeds on the Cape Peninsula, of which two are common in places at Kirstenbosch. One of these appears to be *Hakea acicularis*. Hakeas are readily known by their sharp pointed needle-like leaves, small white flowers, and large woody fruits that split into two portions. *Hakea acicularis* has recently been proclaimed a noxious weed in several divisions and municipalities in the Cape Province, but not so far in the Cape Peninsula.

Very brief mention must suffice for the smaller shrubby plants that are introduced. The Blackberry (*Rubus fruticosus*) is abundant in parts along streams and elsewhere. It forms rather dense thickets with its arching shoots which are covered with prickles and which root at the tips. The blackberry is a European invader: there are indigenous species of *Rubus* which are distinguished by having pinnate leaves while the alien has palmate ones.

Solanum auriculatum, with large softly hairy leaves, is found especially by streams in several places. This plant comes from the eastern part of South Africa. From the same part come the Cape Honeysuckle (*Tecomaria capensis*), which is found near the Tea House, and also the Cape Laburnum (*Crotalaria capensis*).

Many other trees have been planted for ornamental or economic purposes: examples are the Moreton Bay Fig (*Ficus macrophylla*) along the road at the entrance, and the Camphor (*Cinnamomum camphora*) which lines the old road up the hill towards the Bolus Herbarium. Several others have been established but space does not permit of detailed notice; *Quercus suber* (Cork Oak), *Carya pecan*, *Olea europaea* (Olive) etc.

These are only a few of the introduced plants which are prominent and are often met with here. Several others occur in lesser quantities. These plants are well worth studying, both from the geographical standpoint, plants from very varied regions finding a congenial home here, and from the standpoint of their utility, their behaviour in new surroundings and their relation to the indigenous plants.

For the guidance of any who may be interested, the following artificial key for the identification of some of the commoner alien trees is given. The key is based on easily observed external features. Details of floral structure and so on are not included. This key makes no attempt to be exhaustive but it is hoped thta it may assist some in the identification of those plants which are most often met with and yet are not included in accounts of the flora.

KEY TO THE MORE ABUNDANT EXOTICS OF KIRSTENBOSCH.

1.	Leaves needle-like	2
	Leaves not needle-like	5
2.	Leaves borne singly	**Hakea acicularis**
	Leaves in groups of two or three	3
3.	Leaves in groups of three	**Pinus insignis**
	Leaves in groups of two	4
4.	Tree umbrella shaped. Cones blunt	**Pinus pinea**
	Tree pyramidal. Cones pointed	**Pinus pinaster**
5.	Leaves deciduous	6
	Leaves persistent	9
6.	Leaves strongly lobed at margin	**Quercus robur**
	Leaves not strongly lobed; margin entire or toothed	7
7.	Leaves sharply toothed on short stalks	**Castanea sativa**
	Leaves entire or slightly toothed	8
8.	Leaves rounded on long stalks	**Populus canescens**
	Leaves blunt-pointed, toothed, on short stalks	**Alnus glutinosa**
9.	Leaves compound or divided	10
	Leaves simple	14
10.	Leaves pinnate or trifoliate	11
	Leaves palmate, with 5 or more divisions. Shrub	**Rubus fruticosus**
11.	Leaves trifoliate. Shrub	**Crotalaria capensis**
	Leaves pinnate	12

12. Leaves once pinnate, leaflets toothed — **Tecomaria capensis**
    Leaves bi-pinnate, leaflets small — 13

13. Leaves green, flowers sessile — **Albizzia lophantha**
    Leaves dull green, flowers in stalked heads — **Acacia decurrens**

14. Leaves with one main vein — 15
    Leaves with several equal veins — 21

15. Leaves glabrous — 16
    Leaves hairy on underside or both sides — 19

16. Leaves pendent or on pendent branches — 17
    Leaves horizontal or erect — 18

17. Leaves with very prominent vein. No scent — **Acacia saligna**
    Leaves with less prominent vein. Aromatic — **Eucalyptus**

18. Leaves aromatic. Trees — **Eucalyptus**
    Leaves not aromatic, polished above, creeping undershrub — **Vinca major**

19. Plant without prickles — 20
    Leaves and stems with prickles. Small shrub — **Solanum sodomaeum**

20. Leaves softly hairy on both sides — **Solanum auriculatum**
    Leaves with white hairs below, glabrous above — **Buddleia madagascariensis**

21. Leaves dark green, thin, broadened towards tip — **Acacia melanoxylon**
    Leaves paler, narrow — 22

22. Leaves short, erect, stiff, dull green — **Acacia cyclopis**
    Leaves longer, pointed, bright green — **Acacia longifolia**

R. S. ADAMSON.

University of Cape Town,
November, 1927.

Letter to the Editor.

Letter to the Editor.

Dear Sir, —

Your kind letter of May 4th last to hand, for which I thank you. I note you would like to have a few notes on the subject of the cultivation of South African native flora in Australia.

I believe Holland has cultivated "Cape Bulbs" with marked success, but if members of the Botanical Society of South Africa wish to see South African flora in cultivation they should visit Australia.

It is safe to say there are more species of South African flora established in cultivation in Australia than in any other country in the world. To my knowledge some fifty distinct species of bulbous and other flowering plants are grown in the private gardens of Sydney. I have even seen Agapanthus, Gladioli, Amaryllis, Watsonia, and Caledon heath in the gardens of the tourists' resorts on the summit of the "world famous Blue Mountains," 3,400 feet above sea level.

In my own back yard garden are growing the following South African plants. Nerine, Agapanthus, Amaryllis, Clivia, Gladioli, Arums, "Painted Ladies," Freesias, Babiana, Tritonia, Watsonia, Sparaxis, Gerbera, Dimorphotheca, and Red Crassula. Last season I had six fine blooms on the Crassula (Glory of Table Mountain) plant.

Since South African native flora are given pride of place, and widely grown, in the private gardens of Australia, in a country which claims to "possess, perhaps, the most distinctive flora to be found on any of the land divisions of the globe," it is strange they should be so little admired by their own people, as a whole. I removed from South Africa in 1908, and I know that up to that time very few species of native flowering plants were to be seen in the private gardens of the Cape Peninsula.

As a South African I trust I may be permitted to state that what is wanted in South Africa is a greater spirit of national pride in things South African. Thus, for instance, according to the "Cape Times" the City Council are actually planting acacias in Disa Gorge. Have South Africans so little pride in their country and in their own unique and beautiful flora, to plant Australia's national flower and floral emblem on the summit of grand old Table Mountain? To me it seems more than passing strange that foreign flora like the acacias are destined to ornament the top of Table Mountain, the home of the Agapanthus, Disa, Crassula, and Protea, a group of flowers which is found wild in no other country in the world.

As visitors from all parts of the world will shortly ascend to the summit of Table Mountain by aerial railway, to see one of the most magnificent panoramic views in the world, Disa Gorge and other parts of the summit should be planted with species of native flora. A botanic garden on a small scale, of a truly typical South African colour or atmosphere, where visitors could see your native flora in all its glory.

With its wealth of native flora the Cape Peninsula could be made the Garden City of the world.

If the eastern slopes of Table Mountain above Groot Schuur, say from Observatory Road to Newlands and as high up as the upper blockhouse, were planted with native flowering trees (Cape Chestnut and Silver Trees), shrubs, bulbous and other plants, and motor roads and footpaths constructed, you would have, together with Groot Schuur park, the finest and most picturesquely situated public park and gardens the world could show. The wonderful variety of trees and shrubs, the wealth of native flower plants, the animal and bird life, combined with the natural scenic effects of this region, would make of it one of South Africa's most attractive places of resort, and would be visited by nature lovers from all parts of the world.

I enclose a list of your native flora grown here, which are all cultivated by local nurserymen and are obtained from any florist's shop. The most popular plant is the Gerbera (Barberton Daisy). It is termed "The Aristocrat of the Garden," and is obtained in various colours.

Yours faithfully,

H. F. LOUNDAR.

Sydney,
Australia,
June 4th, 1927.

Note by Editor.

Mr. Loundar appends the following list of South African native plants established in cultivation in Australia: Agapanthus, Amaryllis, Anomatheca, Arums, Babianas, Brunsvigia, Clivia, Crinum, Cyrtanthus, Freesia, Gloriosa, Gladiolus, Haemanthus, Ixias, Kniphofia, Moraea, Montbretia, Nerine, Nymphaea, Ornithogalum, Sparaxis, Schizostylis, Lachenalia, Tritonia, Vallota, Watsonia, Aloes, Crassula (Red), Dimorphotheca, Gerberas, Gazania, Geranium, Lanaria, Asparagus, Mesembrianthemum, Nemesia, Pelargonium, Protea mellifera, Plumbago capensis, Strelitzia reginae, Tecoma capensis, Ochna, Gardenia, Calodendron capensis, Cape Heaths, Mackaya, Leonotis. In many cases numerous species are grown of the genera mentioned, e.g., Lachenalia, Watsonia, Mesembrianthemum and so on. It is clear that the South African flora is greatly appreciated in our sister Dominion of the Southern Hemisphere. Mr. Loundar will be interested to know, however, that our native plants are no longer so much despised as they formerly were, and that many of them are finding a conspicuous place in private and public gardens in South Africa. This is very largely the result of the influence of Kirstenbosch.

R. H. C.

The Botanical Society of South Africa.

ANNUAL REPORT, 1926.

The Council has pleasure in submitting the Fourteenth Annual Report of the Society.

MEMBERSHIP.—The membership of the Society stands at: Life Members, 65; Family Members, 60; Members, 481; Associates, 341; total 947.

ANNUAL GATHERING.—The Annual Gathering at the National Botanic Gardens, Kirstenbosch, was held on Saturday, October 23rd, 1926. Owing to inclement weather conditions the attendance was not as large as usual. The meeting was addressed by Mr. W. Duncan Baxter on behalf of the Botanical Society and by Professor Compton, Director of the Gardens.

COUNCIL MEETINGS.—Four meetings of the Council were held during the year.

PRESIDENT: The Rt. Hon. Sir James Rose-Innes, P.C., K.C.M.G.

VICE-PRESIDENTS: Sir Lionel Phillips, Bart., Hon. Sir Lewis Michell, C.V.O., Sir Max Michaelis.

MEMBERS OF COUNCIL.—Sir Drummond Chaplin, Professor Adamson, Professor Compton, Mr. W. Duncan Baxter, Mr. W. A. Eaton, Mrs. F. Bolus, Miss Fairbridge, Mrs. Carter, Mr. P. Stuart Horne, Dr. Bennie Hewat, Mr. F. E. Cartwright, Mr. H. T. Twentyman Jones, Mr. W. de N. Lucas, Mr. H. C. Starke, Miss E. Struben, Mr. W. Webber, Miss F. M. White, Mrs. H. S. van Zijl, Major G. B. Van Zyl, Dr. Lilian Robinson.

JOURNAL.—The twelfth volume of the Journal of the Society was published in December. Fifteen hundred extra copies were printed and distributed to a selected list of non-members with a view to increasing membership, particularly in districts other than the Cape. Letters of appreciation were received from various sources and the Society is indebted to Professor Compton who undertook the duties of Editor.

In response to requests the Constitution and Rules of the Society as amended to date were included in the Journal.

The Council of the Society in collaboration with the Royal Society of South Africa entertained Dr. Carl Schröter, the distinguished Swiss botanist, and his travelling companions Dr. and Mrs. Huber-Pestalozzi to luncheon at the Railway Restaurant on the 24th September, 1926.

The thanks of the Society are due to Miss E. L. Stephens, Mrs. J. E. P. Levyns, Professor Adamson, Professor Compton, Mr. Mathews, and Mr. Cook for their interesting and instructive talks on botanical and gardening subjects, given at Kirstenbosch on various Saturday afternoons during the year. It is to be regretted that the attendance at these meetings has been very small.

FINANCIAL.—The audited financial statement accompanies this Report from which it will be seen that the sum of £454 12s. 6d. has been available for the purpose of augmenting the funds of the National Botanic Gardens.

APPEAL FOR NEW MEMBERS.—It must be constantly borne in mind that the only means which this Society has of benefiting the Botanic Gardens is by augmenting the Membership Roll and thus increasing the yearly grant. Although it is gratifying to be able to report a fairly substantial increase in Membership it is still necessary to emphasise that the Gardens are in urgent need of funds for their maintenance and development. Members are urgently requested to interest their friends in the work at the Gardens and to point out the privileges attached to Membership, thereby inducing as many as possible to become Members of the Society.

N.B.—*Life Members*, £25; *Annual Members*, Family Members, £2 2s.; Ordinary Members, £1 1s.; Associates, 5s.

The Council has to express its indebtedness and hearty thanks to Mr. R. L. McDonald for auditing the accounts of the Society; to the City Council and the South African Association for the use of rooms for purpose of meetings, and also to the Press for their valuable assistance in reporting the affairs of the Society.

DRUMMOND CHAPLIN,
Chairman

BOTANICAL SOCIETY OF SOUTH AFRICA

BALANCE SHEET as at 31st December, 1926

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Life Members' Reserve Fund.			Union of South Africa 5% Loan 1929/39 (Cost)	200 0 0	
Balance—31st December.	505 0 0		Accrued Interest	2 18 1	
Added during year	75 0 0				202 18 1
		580 0 0	Cape of Good Hope Savings Bank	352 7 7	
Sundry Creditors		12 0 0	Accrued Interest	17 12 4	
Subscriptions paid in advance		31 10 2			369 19 11
National Botanic Gardens, Kirstenbosch Surplus for year 1926		454 12 6	Sundry Debtors		24 10 0
			Cash at Bank		480 14 8
		1078 2 8			1078 2 8

Revenue and Expenditure Account for Twelve Months ended 31st December, 1926

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Journal Account, 1926	46 19 3		By Subscriptions:—		
,, Bank Charges	1 7 9		Ordinary	420 0 0	
,, General Expenses	64 19 9		Family	107 1 0	
,, Gathering at Kirstenbosch	22 4 4		Associate	62 13 0	
,, Stationery and Printing	28 2 9				589 14 0
		163 13 10	,, Donations		1 0 0
,, Surplus for 1926		454 12 6	,, Interest		27 12 4
		£618 6 4			618 6 4

Audited and found correct,
(Signed) R. L. McDONALD,
Hon Auditor.
Cape Town, 31st January, 1927.

H. T. TWENTYMAN JONES, *Hon. Treasurer.*
DRUMMOND CHAPLIN, *Chairman.*

List of Members of the Botanical Society

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary, P.O. Box 267, Cape Town.

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(*b*) To augment the Government grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch.

(*c*) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

(*d*) To enlighten and instruct the members on botanical subjects by means of rambles, meetings, lectures and conferences, and by the distribution of literature.

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Cotyledons, Crassulas, Euphorbias, Aloes, Stapelias, Mesembrianthemums and other plants of a like succulent nature, and also the *Epiphytic Orchids*, should be packed dry. Each species should be wrapped in paper and laid tightly in a box. Large specimens of *Aloes, Euphorbias, Cycads*, etc., may be trucked loose.

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Edited by R. H. COMPTON, M.A., F.R.S.S.Af., Director of the NATIONAL BOTANIC GARDENS :: :: :: KIRSTENBOSCH :: :: ::

Part XIV 1928

Published under the authority of the Council of the Botanical Society

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Accommodation is provided for those who wish to undertake private work in botanical or other natural history subjects, etc., at Kirstenbosch.

For particulars apply to the

Director, National Botanic Gardens,
Kirstenbosch, Newlands, C.P.

Photo: *R. H. Compton.*

PLATE I.

THE NEW SUCCULENT GARDEN AT KIRSTENBOSCH.

Construction work proceeding with funds granted by the Botanical Society.

The Journal of the Botanical Society of South Africa.

EDITED BY R. H. COMPTON.

PART XIV 1928

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News and Notes.

IN last year's Journal of the Botanical Society we pointed out the steady growth of the Society as shown by the statistics of membership, and we remarked that the thousand mark was within easy reach. In 1927 this prophecy was fulfilled, a nett increase of 56 members being recorded during the year, and the total now being for the first time four figures. The following table shows the way in which the Society is growing.

	Life.	Family.	Ordinary.	Associates.	Total
1914	33	22	264	33	352
1915	46	26	263	32	367
1916	49	26	264	45	384
1917	46	24	249	53	362
1918	49	28	281	78	436
1919	50	38	320	84	492
1920	54	45	384	237	720
1921	54	48	407	287	795
1922	55	52	418	301	826
1923	59	50	405	269	783
1924	62	57	455	313	887
1925	62	58	462	330	912
1926	65	60	481	341	947
1927	68	60	522	353	1003

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The above table shows that the Society has grown with great regularity since its birth. Apart from a slight set back in 1917 due no doubt to war-time economies, and another in 1923 when a considerable number of members in arrears were written off, progress has been made every year, both in the total and in all classes of membership separately. The sudden increase in 1920 was due to special canvassing activity in the Stellenbosch district on the part of friends of Kirstenbosch.

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The growth of the Botanical Society has been due to two chief causes. Many people have been attracted to join the Society for the sake of the advantages they derive therefrom. They have gardens and are anxious to obtain and grow some of the South African wild flowers: many of these are unobtainable through ordinary trade channels: it is too difficult and expensive to collect them on the mountains, on the karoo and in all the remote corners of the Union: and Kirstenbosch is the only practicable source from which they can be obtained. Many members have therefore joined the Society with a view to adding to their own gardens. To these the Kirstenbosch authorities give what they can with great pleasure, for two reasons. One reason is that it is one of the aims of Kirstenbosch to interest South Africans in their own flora and to assist them in cultivating and preserving it. The other reason is that those who join the Society in the first place for what they can get out of it, usually continue as members in order to help the Gardens which have helped them and which they perceive to be worthy of their support.

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The other members are those who have seen from the outset that Kirstenbosch is a great national institution, the only one of its kind in the world, peculiarly and distinctively South African: that it is doing a specially valuable work in collecting, cultivating and studying the unique flora of the country, and in educating the public taste, interest, and respect for it; that the support it receives from Government and other public bodies is inadequate for its needs, but that whether it gets Government aid or not is not going to prevent them from giving a helping hand as individuals. These are the true lovers of Kirstenbosch, the backbone of the Botanical Society.

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It is a matter of some interest to analyse the membership of the Botanical Society in order to ascertain the different degrees in which it is supported from different regions. The following table represents the number of members and associates of the Botanical Society in the various provinces, and overseas (at the date of writing).

Cape Peninsula	557
Cape Province (excluding Cape Peninsula)	222
Orange Free State	16
Natal	41
Transvaal	68
Rhodesia and British East Africa	25
Overseas (chiefly England and U.S. America)	147
Total	1076

As is to be expected, the Cape Peninsula, in which Kirstenbosch is situated, takes the lead in the support it gives to the Botanical Society, more than half the members being resident there. The remainder of the Cape Province, however, contributes nearly twice as many members as the other three provinces put together: this may reflect the greater interest taken in the indigenous flora in the Cape Province, perhaps because it is in that province that the majority of the botanical glories of the Union are concentrated. The fact that the Society includes many members from the more distant provinces shows that Kirstenbosch has a national appeal and scope: and the same fact is reflected in the list of those who have contributed plant material to the Gardens. Finally, attention may be called to the fact that no fewer than 173 members, or 16 per cent. of the whole, live outside the Union. This is an indication of the reputation that Kirstenbosch has acquired overseas. It is perhaps surprising to find that the Society has many more members overseas than in the Transvaal, Free State and Natal put together. One is reminded of the "not without honour" proverb.

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In last year's Journal of the Botanical Society the experiment was tried of including two coloured plates representing some of the more distinctive forms of the so-called "stemless Mesembryanthemums." The innovation met with a warm welcome from members of the Society, and many letters and expressions of appreciation were received. Although the expense was considerable, the Council of the Society therefore decided to authorise two coloured plates in this year's Journal also.

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Last year the Journal was devoted very largely to the succulent plants of South Africa. This year we focus attention on a totally different subject, the genus Gladiolus. South Africa is the principal home of this beautiful group of plants, with outliers in Asia, the Mediterranean region and with one exceedingly rare species even in England. No genus of bulbous plants has received more attention from horticulturists than has Gladiolus, and this has resulted in an astonishing variety of garden forms and hybrids. Today Gladioli are among our most popular garden flowers: they have made the fortunes of nurserymen and hybridists; special societies and journals exist for the Gladiolus "fancy"; there are breeders and raisers who devote almost their whole attention to them; and the corms are grown and distributed in countless thousands to gardens, especially in America and Europe, at prices varying from a cent or two to hundreds of dollars each. Here in South Africa are the wild species from which all the innumerable garden varieties have been derived. They have a simplicity and grace which most of the hybrids lack. It is to these that we are devoting the present issue of the Journal.

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Mrs. Bolus, Curator of the Bolus Herbarium, contributes an article on the botanical aspects of the genus Gladiolus. The two coloured plates which accompany her articles are reproduced from the original drawings made from life by the late Mary Page, botanical artist to the Bolus Herbarium, and by Miss B. O. Carter, her successor. In addition, Mr. Mathews, Curator of Kirstenbosch, contributes an article on the cultivation of our wild Gladioli which should be of great value to those who would like to grow these most charming plants in their own gardens.

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Mention of the hybrid Gladioli leads us to recall that only a few years ago a revolution was caused in the Gladiolus world by the introduction of a species with a yellow flower — a plant well-known to many in South Africa as the "Maid o' the Mist" of the rain forest at the Victoria Falls and in other parts of the Zambesi region and elsewhere, *Gladiolus primulinus*. The use of this species in hybridisation produced an entirely new race, the "primulinus hybrids," now numbering scores of varieties, possessing valuable qualities of form and colour unknown before. Two words may now be spoken to the wise in these matters. Firstly, there are no *blue-flowered* Gladiolus hybrids in existence: in South Africa several of our wild species are blue-flowered. Secondly, there are no scented Gladiolus hybrids: in South Africa several of our wild species have a powerful and delicious fragrance.

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Here indeed is work for Kirstenbosch, and a small beginning has actually been made in these directions. Why is not more work on hybridisation carried out here, with the raw material at our disposal? The answer is that Kirstenbosch has no scientific or technical staff whatever, and that extensive experiments in hybridisation could only be carried out to the detriment of the other manifold work of the Gardens. Here is a new sphere of work with endless possibilities: here is the material for the work: and here is the opportunity for a benefactor to devote a sum of money to pay the necessary expenses of the work. If we do not do it here they will assuredly do it overseas, just as all

previous cultural work on our native plants — Pelargoniums, Ericas, Barberton Daisies, Dimorphothecas and the rest — has been done. The Director of the National Botanic Gardens would be very glad to discuss the matter with any one who would like to provide the necessary capital in order to initiate work on these lines.

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A curious incident in connection with Gladiolus is recorded from the United States. One of the most successful breeders of hybrid Gladioli in America, Mr. A. E. Kunderd, was requested to resign his church membership, the church council regarding his hybridisation experiments as impious attempts to interfere with the order of creation. It would no doubt interest the church council to listen to, say, Dr. J. P. Lotsy (recently a visitor to South Africa), who we think would open their eyes on the subject of natural hybrids, and might even perhaps persuade them that creation works through hybridisation.

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The Edward Muspratt Solly Scholarship was founded by Mrs. H. le G. Solly three years ago in memory of her late son, for the assistance of promising students and the promotion of botanical research. During 1928 the Scholarship has been held by Miss Phyllis Barnes, B.Sc., who has recently graduated in Botany and Mathematics at Rhodes University College, Grahamstown. Miss Barnes had a distinguished record at school and college, and earned strong recommendations from her teachers. She has undertaken research work at Kirstenbosch, in accordance with the terms of the Scholarship, being engaged in a systematic revision of the genus Heliophila, in hybridisation work, and in assisting the Director in his work on the flora of the Whitehill and Witteberg district. We wish Miss Barnes a very successful future.

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Mr. Hay, the Superintendent of the London Parks, writes to the Honorary Secretary of the Botanical Society (23rd October, 1928):—

> "South African composites have done exceedingly well in the Parks: I have had glorious beds of Arctotis, Venidium Wylei and Ursinias: they have been much admired. I have also had these in Buckingham Palace Gardens where they came in for considerable admiration. Next season I propose to have a bed of all the Gazanias I can gather together: I think I have ten sorts, species and hybrids."

We wonder how many South African gardens can boast ten sorts of Gazanias to say nothing of Arctotis, Ursinias and Venidiums. Once more it is a case of "not without honour."

The persons who light dangerous fires among the bushes, who ravage amongst our flowers, and who scatter papers and tins over our beauty spots are generally execrated as perpetrators of an abominable nuisance. That this feeling is no new one may perhaps be gathered from the following old English poem, whose authenticity however we cannot guarantee. It is entitled:

YE VERDERERS' VENGEAUNCE.

None scall[1] for fernés digge;
Ne flourettes faire yspoile;
Ne mid ye swete gale ligge[2];
Ne pottés bring to boil;
Ne filthy drass[3] scall leave,
Ne drented[4] jubbés[5] strewe,
That Forest folk aggrieve —
Albeit they be but few.

Or, ere they wend away
Amercement scall they pay.

Who fyres foull scall lyghte
On gron[6] where lessels[7] grees[8];
Wylde beastés sore affryghte,
And royn[9] vertés[10] trees;
Unquacéd[11] scall not go.
Bye there be such ylain[12]
In Stockés, till grass grow,
And woods be fair again.

There long abaie[13] in feare
Of ouphen[14] and nadere[15].

Houndés gif[16] any hedd;
Or beastly bellow make,
Whereby men be mis-led,
Ne stagge from covert brake,
Or foxe be driven in
That did essaie to flee,
So the voye[17] foyléd bin[18];
His lyffe scall forfait be.

Sic jintles[19] lawes, per-case[20],
Scall kepe the leegefolckes[21] chace.

NOTES.—1, shall; 2, lie; 3, rubbish; 4, drained; 5, bottles; 6, the moor; 7, bushes; 8, grow; 9, ruin; 10, green; 11, unpunished; 12, lying; 13, abide; 14, elves; 15, adders; 16, if; 17, scent; 18, shall be; 19, gentle; 20, haply; 21, subjects.

A paragraph in the newspaper tells that the late Mrs. Lankester of Simonstown bequeathed a sum of £100 to Kirstenbosch "in memory of my pride and pleasure in those gardens." Mrs. Lankester was one of the best friends that the Gardens have had, and whenever she could do so she made a point of collecting and sending native plants to add to the collection. Indeed it was while she was collecting plants in Rhodesia for Kirstenbosch last July that she was taken suddenly ill and did not recover.

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Mr. J. Hutchinson, F.L.S., of the Herbarium, Royal Botanic Gardens, Kew is at present on a visit to South Africa. He arrived in the middle of August and proposes to spend nine months in the Union, during which time he will make an extensive tour of the different botanical regions collecting material for systematic work. Mr. Hutchinson is in charge of the African collections in the Kew Herbarium, and is well-known in the botanical world through his recently published "Families of Flowering Plants" (reviewed in the 1926 issue of the JOURNAL), his large work on the Central African flora (in collaboration with Dr. Dalziel) of which two volumes have so far appeared, and other systematic work including contributions to the Flora Capensis.

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The aerial cableway up Table Mountain approaches completion. It will enable many people to enjoy the grandeur of the view from the summit who would not enjoy, or would be incapable of, the ascent on foot. On the other hand, it is to be feared that many persons will be transported to the Table who will have no respect for its beauties, and that the result will be less flowers and more litter. We hope that the Aerial Cableway Company will do what it can to remind excursionists that they will not be welcome on the mountain if they rob it of its flowers and leave tins and papers in their place. Notices displayed at the two stations would probably have a salutary effect.

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Fears for the safety of the Table Mountain flora were forcibly expressed by Sir James Rose-Innes in an address given at the Cape Town Wild Flower Show in October. Sir James made a strong plea for the proclamation of the whole of Table Mountain as a Nature Reserve, in which the native flora would be protected from destruction. A great part of the Mountain above the level of a few hundred feet is in public ownership. The Cape Town water catchment area is enclosed by a fence and the public is excluded. The Wynberg catchment is not enclosed, nor is the Upper Kirstenbosch Nature Reserve: and most of the remainder of the Mountain is Crown land administered by the Forest Department, which cares for its plantations but exercises little or no surveillance over the areas without timber. Only the Cape Town catchment area therefore serves the purpose of nature protection, and even in this the Municipality plants exotic trees and favours the spread of that aggressive weed the Blackwood Wattle in Disa Gorge: moreover the exclusion of the public, though a means of safeguarding the water supply, is at variance with the principle that Nature Reserves should be open to everybody and respected by everybody.

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Table Mountain could be nominally made into a Nature Reserve by a few strokes of the pen: and it would then be necessary to appoint rangers for fire-protection, for combating the spread of exotics, for the collecting of litter and for checking the depredations of flower pickers. This would involve a certain expense, but it would be worth while even from the narrowly practical point of view to incur such expense. The City Council and the Publicity Association would find that the preservation of Table Mountain as a Nature Sanctuary would be a most valuable addition to the attractions of Cape Town. If the visitor could be told that he would be sure to see the Blue, the Mauve, the Cluster and the Red Disas on the Mountain without the proviso "If they do not happen to have been picked," how great an attraction this would be. It would be worth the while of the Aerial Cableway Co., for the same reason. Moreover the value of the timber plantations on the lower slopes of the Mountain is now such that the Forest Department would be well advised to assist in appointing rangers in order to check outbreaks of fire in the Reserve. For be it observed that, with the increase in visitors via the cableway, the number of fires originating through carelessness is going to increase very materially.

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Cape Town has a great opportunity and responsibility in this matter. If the Mountain is to be "exploited" it must also be cared for: and we do not want to take car loads of visitors up the Mountain to behold stony and flowerless wastes, blackened with fires and strewn with tins, papers and bottles. The only way to prevent this is to proclaim as much of the Mountain as possible a Nature Reserve, and to take the necessary precautions mentioned above.

During the past twelve months steady progress has been made with construction work in the new Succulent Garden at Kirstenbosch. The Botanical Society in 1927 voted £300 from the Life Members' Fund for this work and this amount is now exhausted. A request for a further contribution of £200 in order to round off and complete the first section of the work has been made, and the Council of the Botanical Society will hold a special meeting in December, to consider this application.

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The Annual At Home of the Botanical Society was held in moderately good weather on 13th October, 1928, and there was a large attendance of Members and their friends. Tea was served on the lawn, Mrs. Key being responsible for the catering, and speeches were made by the President of the Society, Sir James Rose-Innes, and by Professor Compton. The new Succulent Garden in process of construction was open for Members to inspect the progress that had been made. The Director pointed out in his speech that the past year had been a record one in many ways: the Botanical Society had a record number of Members, the number of contributions of plants received was a record for recent years, the number of visitors to the Gardens was larger than ever, the European staff was larger than before though still inadequate, and the Government Grant had been raised though not nearly to the required amount.

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Our Frontispiece shows a section of the new Succulent Garden in process of construction. The site chosen for the purpose provides a north aspect and a moderately good deep and well drained soil: but no stone was present. Stones are an essential factor in the successful growing of succulents, providing shelter and cool conditions for root development, and it is therefore necessary to bring stone to the site from a distance. This has been the chief item of expense. In order to obtain a dignified and worthy rock-garden the boulders brought have to be as large as possible: some have to be split in order to facilitate transport. The rocks used are being taken for the most part from the sites of future roads, so that progress in other directions is being made simultaneously.

The new Curator's House at Kirstenbosch is the latest addition to the residential equipment of the Gardens. The old Ranger's Cottage had long been recognised as unfit for habitation, but no funds were available to make an improvement. The bequest from the late Dr. W. de Korte, together with a grant from the Government, made it possible to build a new house for the Curator: and on his going into residence there, the house he had vacated was allotted to the Ranger. The old Ranger's Cottage is now used for temporary gardening purposes and should be pulled down before long. The new Curator's house is situated in the new Nursery: the Architects were Messrs. Walgate & Elsworth of Cape Town, and the builder Mr. S. Moffat of Salt River. Plate IV.A. is from a photograph, from which it will be seen that the new house is of an attractive design: the white walls and thatch roof fit in well with the Kirstenbosch landscape.

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The other photograph, Plate IV.B., shows the new Nursery Buildings at Kirstenbosch. These comprise a propagating house and a succulent house, both with potting-rooms and frames, an office for the Curator, packing-room, store, drying-shed and distillery. These buildings were all erected departmentally by Gardens labour, the funds coming largely from a generous donation from Sir Otto Beit with a grant from the Government. The provision of reasonable nursery buildings has facilitated work enormously as compared with the cramped conditions of a few years ago.

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A landmark which has disappeared, unregretted, is the two-roomed structure of stones and mud which stood at the top of the old Nursery. It was in this that Professor and Mrs. Pearson lived in the early days of the Gardens: its previous history is obscure. Later it was adapted as a Gardens Office, *faute de mieux*, and here Director, Curator and Secretary worked while rats devoured papers and seeds, rain dripped through the ceiling in wet weather and dust trickled through in dry, the chairs made from old casks, the only light coming from the door which could hardly be kept open in windy weather. The wretched old shack has now been demolished and is no longer an eyesore and a reproach.

Notes on Gladiolus as represented in South Africa.

SOUTH Africa is as justifiably proud of her "bulbous" plants as she is of her succulents. In the early days of her history travellers came, like Caleb and Joshua, and returned with the tidings—"that the land which we passed through to search it is an exceeding good land," as their trophies, too, bore witness. Since then we have had our Queen-of-Sheba-visitors, whose expectations have been more than doubly fulfilled. And now that we have ourselves become a people, with us lies the responsibility of guarding this glorious heritage, lest we in the agony of our souls re-echo the cry "Ichabod" — the glory is departed!

The National Botanic Gardens are doing their noble part in the preservation of the native flora, and are thus averting the great calamity which seems to loom ahead of us. For year by year, sent in from all parts of the Union, fresh beauties are unfolded there; and we marvel at the wealth of our treasure, ever striving to comprehend and set down something of its infinite charm and variety. From this stock seeds are distributed to be grown in private gardens, and many of our "bulbous" plants may be considered safely established in cultivation. The number is steadily increasing — more especially in the case of the family, *Iridaceae*, whose *Sparaxis*, *Tritonia*, *Ixia*, *Watsonia*, *Freesia*, *Babiana*, *Crocosmia*, and, above all, *Gladiolus* (let us not yield to the obvious temptation of calling it "Gladiola"!) are acknowledged favourites. Of recent years *Gladiolus* has been honoured in the foundation of two Gladiolus Societies — one in England and one in America. It is also most interesting to hear of how Gladiolus-seeds are being supplied by flower-farmers here to botanical laboratories abroad.

All this should give an additional impetus to the study of a genus which is so well represented in South Africa, where it is by far the largest in its family, with some 130 species known and more — who shall say how many? — still to be discovered. In the present state of our knowledge at least we may claim more than half the world's species, the latter being set down at 250 according to Dr. Phillips' recent estimate.

Linnaeus' name, *Gladiolus* or "little sword," is derived from *gladius*, a sword, and refers to the sword-shaped leaves of the European species first described. For the genus as we understand it now is by no means entirely composed of the robust or "gladiatorial" species, of which some have been used in forming the splendid garden hybrids. On the contrary, there are as many, if not more, *Gladioli* of slender growth and with narrow, grass-like leaves; and authors have found this difference in leaf-form a convenient basis for an important sub-division of the genus. Those of us who are studying *Gladioli* will, therefore, do well to decide at the outset whether our species are to be placed in the broad-leaved or narrow-leaved group. There will, of course, always be the debatable ground where the "betwixts and betweens" do congregate, and where it is difficult to distinguish between "broad" and "narrow"; but we must then discard the leaves and resort to floral characters for attaining a clear idea of the affinities of our species with those already placed in either of the two divisions. Four of the *Gladioli* (Nos. 1, 3, 5, 6) illustrated here would range with the "gladiators," while *G. gracilis* (No. 4) is a typical representative of the frailer kind. The produced leaf of *Gladiolus* (No. 2) is not shown; for it is not developed at the time of flowering, and we have chosen this species to illustrate a phenomenon, which is rare in the genus and, indeed, in the whole family. In the familiar instance of *G. brevifolius*, flowering in the autumn, the leaves appear after the first winter rains (and may lengthen to nearly 3 feet!) In *G. jonquilliodorus* when the flower-shoot is showing the leaves are drying, although still persisting in their entirety. This is in December or January, and the leaves were probably at their best in September and October. In both cases, however, we regard the leaves as coming after the flowers, and employ the botanical term, hysteranthous (after flowering), to describe this habit. It may be that when detailed observations are made on this point in *Gladiolus* we may feel more justified in regarding the leaves as products of the spring, the prime of the year, and thus as heralds of the flowers. An interesting variation may be noted in a Natal species, *G. inandensis*, where, although leaves and flowers are contemporaneous, they are produced from separate buds on the corm. In passing, one may also mention that some of these narrow leaves, for all their apparent sameness and insignificance, exhibit some remarkable differences. For instance, in *G. gracilis* the margins are dilated so that the leaf-surface is

increased thereby, and the space on each side of the mid-rib is shaded; and in G. *tristis* we find the mid-rib as well as the margins dilated, and the whole leaf with a spiral twist which seems to give it a certain amount of rigidity.

Broadly speaking, the narrow-leaved group is best represented in the Western Province and in the southern coastal districts eastwards, the more robust species occurring further east into Natal and westwards to the Transvaal and Basutoland. When narrow-leaved species are found in the latter areas, they generally have three or four long leaves; whereas the prevailing rule in the west is for the third leaf only to be fully produced, the two basal ones remaining entirely sheath-like, and the three upper ones having but short free points, as exemplified in G. *gracilis* (No. 4). In the Karroo *Gladiolus* is well-nigh absent, the only species that readily comes to one's mind being the rather dull-coloured, narrow-leaved G. *edulis*, so-named by Burchell because the corms are edible. A beautiful "Yellow Bell" (G. *Pritzelii*) grows in the Sutherland Division, and has been collected near the town of Sutherland; and a Bluebell (G. *Taubertianus*) is found near Touws River.

Probably the greatest concentration of the genus occurs on the Cape Peninsula, reckoning that area as 197 sq. miles. Within these limits we have about 22 species, encircling the year with their varied charm of form and colour and fragrance. It is, perhaps, scarcely necessary to mention their names; and if one does linger lovingly over them, recalling one's youthful memories of the Aandbloms, Painted Ladies, Papies, and Afrikanders that marked the passing of the months, our resolution to guard these life-long friends is strengthened thereby, and our vows are re-pledged.

Here are some of their names, scarcely poetical but nevertheless descriptive, with their suggestions of hue and shape and flowering-season. For the New Year on the mountains there are Christmas Painted Ladies (G. *Pappei*) and Autumn Painted Ladies (G. *tabularis*) for February; on the lower slopes Little Pink Papies (G. *brevifolius*) arrive in time for the end of March and bloom throughout April, even lasting into May, when early Brown Afrikanders (G. *maculatus*) are due and stay on to sweeten June. With July comes the Little Blue Papie (G. *gracilis*) to herald the throng of spring — Blue Vlei Papie (G. *biflorus*), Small Brown Afrikander (G. *tenellus*), Gold Papie (G. *aureus*), Pink Papie (G. *villosus*), Blue Afrikander (G. *recurvus*), Painted Lady (G. *debilis*), Kalkoentjes (G. *alatus*), Pink Bell (G. *inflatus*), and Aandblom or Large Brown Afrikander (G. *grandis*), and others. These are followed by the queen of them all, our Broad-leaved Painted Lady (G. *blandus*) on the mountain-slopes, and on the Flats, the curious brown and yellow sand-lover, G. *arenarius*, which is often mistaken at first sight for an orchid; and to close the year come, almost as if belated, one or two Painted Ladies that seem to have been overlooked by the botanist, since we have as yet no name to give them with any certainty.

From this goodly company in days of old were chosen the first of the *Gladioli* that made the long voyage to Europe and delighted the eyes of flower-lovers in northern climes. Their portraits appear in some of the earliest books illustrating flowers, and in later years the call has ever come from overseas for more, and still more of these treasures. How far it has been answered may be gathered from the pages of the "Botanical Magazine," "Botanical Register" and other works of this nature. It would seem that throughout this century and a quarter we have made a generous response from South Africa; but it would probably be nearer the truth to say that not one half of them is yet known in European collections of living plants.

Botanically the *Gladioli* of the Cape Peninsula very fairly represent the three subgenera into which this large genus has been divided. First there is the group of *Eu-Gladiolus* or *Gladiolus proper*, which contains nearly all the species. The second subgenus, exemplified by the well-known Red-and-Green Kalkoentje (G. *alatus*), is characterised by having the hooded uppermost petal set apart from, and above, all the rest, (giving the flower rather a three-storied appearance) and tapering downwards into what is called a claw or narrow stalk-like portion. The sepals are also clawed, and the flower in consequence has an open or loose appearance, quite different from the compact look of the flowers illustrated here. In the latter the hooded petal is either on a level with the sepals, or below their upper margin; or, more rarely, the contrast is still stronger and we find, as in G. *coccineus* (No. 6) the petal extending beyond the lower margin of the sepals. In all these cases the sepals, ranging with the hood, contribute some share towards making it; so that the flower has two distinct parts, each consisting of three segments, namely, the upper or sheltering portion, known as the upper lip, under which the stamens and style are arched, and the lower more consolidated lip which serves as the landing-place for the pollinating visitor. The lower lip is always adorned with some form of "painting," in one or more contrasting colours, which is often very beautiful. In the third subgenus, comprising G. *arenarius* and G. *montanus*, the flowers are also of the loose type, the perianth

segments being clawed. But the blade-portion is narrow and curls backwards so that a difference between the two subgenera is discernible at a glance. The bracts, too, in this small group are distinctive; for they are short, rigid in texture, and dark brown, and in all these respects unlike the large green herbaceous bracts which otherwise prevail in the genus. There is something to be said, therefore, in support of the authors who regarded this group as being a genus apart from *Gladiolus* altogether.

The Kalkoentje-allies contain some species well worthy of mention here. Perhaps the most striking, both in colour and form, is *G. orchidiflorus*, commonly called Green Kalkoentje, from the Darling, Hopefield, and Clanwilliam Divisions. With a much more restricted range and, one rejoices to record it, still plentiful (probably owing to the care of some flower-loving golfers) we have fragrant *G. bicolor* or Yellow Kalkoentje, hitherto only known from the vicinity of Caledon. In Namaqualand, south of the Orange River, several fine species occur, including Scully's and Drége's (*G. Scullyi* and *G. Dregei*) and *G. arcuatus* or arched Gladiolus. Perhaps the daintiest of the group is *G. formosus* of the Ceres and Clanwilliam Divisions, varying from purplish blue and yellow to pink and yellow. Going eastwards into the Swellendam and Riversdale Divisions we come upon *G. pulchellus* or "pretty little Gladiolus," mauve and pink, with its prettily veined uppermost petal flattened like a flag, or with but the faintest indication of "hooding"; and *G. permeabilis* or "permeable Gladiolus" (grown in Europe before 1766) extending, according to some authorities, from Swellendam to Tembuland and even into Bechuanaland, and with its bewildering forms and varieties merging into *Eu-Gladiolus*.

Throughout the genus the stamens and style are arched, the stigmas are three, and the symmetry of the flower is zygomorphic or yoked — that is to say, a line drawn in the middle, and from the top to the bottom of the flower will divide it into equal parts — each yoke-fellow consisting of half the uppermost petal, 1 side sepal, 1 side petal, and half the lowest sepal, together with one stamen and a half, and one carpel and a half. There is still another essential character to be mentioned, namely, the shape of the perianth-tube: its lower part must be slender, and its upper part must be funnel-shaped. One stresses this point because the only constant difference between *Gladiolus* and its close ally, *Antholyza*, consists in the cylindrical shape of the latter's tube compared with the funnel of the former. With regard to the slender lower portion — this may be elongated for inches in *Gladiolus*, whereas in *Antholyza* it is comparatively short.

Such are the rigid rules prescribed for a Gladiolus-flower, and yet, strictly kept as they are, a truly marvellous variety of form has been achieved in the genus. For instance in *Eu-Gladiolus* we have the inflated or bell-type, with which we are all familiar in the Caledon, Tulbagh, and Riversdale Bells; the long flowing lines of the Large Brown Afrikander and some of the Painted Ladies; and the trumpet or papie as exemplified in *G. jonquilliodorus* and *G. gracilis* (No. 4). In *G. crassifolius* (No. 1) there is an approach to the bell-type, the divergence being that the upper lip is distinctly separated from the lower. Here, too, the flowers are small for the genus and, as usually happens in such cases, they are more numerous and more crowded, as if to make up by mass-effect what is lost by individual mediocrity. Another form of perianth, with broad sepals spread wide like the wings of a butterfly, shows its fullest beauty from a front view, as in *G. Stanfordiae* (No. 3).

Our remaining illustrations represent two examples of a very handsome section of *Gladiolus*, picturesquely known as the "Dragon-heads," perhaps from some fancied resemblance to those dread beasts, or perhaps, because some of the finest species of the section rear their fiery heads on the Drakensbergen. They are not all, however, flaming with tongues of red and yellow; for some are a dull greenish yellow, and others a golden, or, as in the lovely "Maid of the Mist" (*G. primulinus*) a primrose yellow. The Parrot Gladiolus (*G. psittacinus*) is probably the best known in the group. One feature most of them have in common is the depth of the hood and its manner of curving downwards, so that the inside of the flower is completely hidden. An extreme example of this is manifested in *G. coccineus* (No. 6); while in *G. Pageae* there is a departure from this mode, in that the hood is more horizontal, and its apex is sufficiently turned up to expose in some degree the stamens and stigmas.

These, briefly, are the chief forms of Gladiolus-flowers. Between them are countless delicate gradations, satisfying and delighting our aesthetic sense — for "God fulfils Himself in many ways, lest one good custom should corrupt the world." But alas! all these numerous shades of difference are, as yet, far beyond our mere botanical powers of description and classification. Let us turn our attention from the individual flowers and note that they are arranged close to the flowering-axis and form a spike, which is scarcely ever branched. The large herbaceous bracts support the tube in a more or less upright position while the rest of the flower leans forward, in a nice friendly meet-you-half-way manner. The bracts are developed alternately, forming two ranks; but the flowers very often swing

slightly round, and, instead of facing in opposite directions, array themselves more effectually in a broader and denser band. On the opposite side of each bract, and with the flower-bud securely clasped between them, is another bract-like structure composed of the two bracteoles. These are sometimes completely united, or far more often they are free towards the apex. They may equal, or even exceed, the bracts in length; but as a rule they are shorter. It is often interesting to watch the gradual transition between the upper stem-leaves and the bracts. The former may become more and more reduced until a node is reached where it is impossible to tell if one has come to the uppermost leaf or the longest or lowest bract — unless a flower-bud is developed in its axil to decide the point in favour of the bract.

The " bulbous " part of a *Gladiolus* is known botanically as a corm. It has also been aptly described as a " dry bulb " because of its rounded form, and because the coverings are dry and fibrous and the central part solid; whereas in a true bulb, like the onion, the coverings are juicy and there is no solid part within their wrappings. The difference is worth considering; for in a bulb the stem-portion is small and flat and the food-reserves are packed into the thickened leaf-bases. In a corm, however, a portion of the stem is thickened and stored with reserves of food, and is protected by a covering of dry leaf-bases. These covers or tunics sometimes afford distinguishing characters. For instance those of *Gladiolus* (No. 2) are soft and thin, splitting up into fine fibres, while those of *G. gracilis* (No. 4) are rigid and thick in comparison, splitting up into coarse fibres. Most of the tunics have been removed from the corm of *G. Pageae* (No. 5) and the shrivelled remains of a previous year's corm are shown, surmounted by the thickened portion of this year's corm, which is to serve for the next year's growth. When this growth begins, slender feeding-roots will find their way through the tunics all round the corm; and a little later a much thicker root may develop from one side of the corm, swollen with moisture. This in due course dries and the consequent contraction of the root pulls the corm a little deeper into the ground. Such normally are the preparations below the surface before the long sleep begins; while above ground the leaves, having done their work, are turning brown, and the fruits are drying into capsules, splitting from the top into three ever more widely diverging parts, each part with its double row of closely packed winged seeds ready to be carried off by the breezes till the lowest is gone. Then the dried stem loosens its hold on the corm and the plant is completely dormant. For there seems to be no record of an evergreen *Gladiolus*, whether on mountain slopes or sandy flats; in shallow pans where *G. biflorus* plays Narcissus, or marshy beds where, tall and pale, *G. tristis* woos the moths with fragrant breath; nor yet where the Waterfall Gladiolus (or New Year Lily) blooms within sight, or even touch, of the falling spray, and the Cliff Gladiolus of Hermanus, like Sapho, looks across the waves. Thus and thus has Nature provided for the well-being of these her offspring, that their days may be long in the land.

PLATE II.

1. GLADIOLUS CRASSIFOLIUS, Baker. The " Thick-leaved Gladiolus " is a native of the Transvaal, Natal and Griqualand East, where it flowers in the summer and autumn. The veining of the leaves is less prominent in the living than the dried state. Several collections have been grown and flowered at Kirstenbosch, among them the original of this painting. The species varies in height up to about 3 feet, and there is a considerable variety in the colouring of the flowers, which are sometimes a dull reddish brown, or, as in the example illustrated, a reddish pink and purple, or, perhaps prettiest of all, a salmon-pink with dark red. In all cases, towards the apex of the segments, the colour deepens or there is a contrasting colour.

2. GLADIOLUS SP. This represents a plant collected by Mr. N. S. Pillans on the Cape Flats, near Paarde Vlei, in April, 1918. Only one specimen was found at the time and we have not seen it since, so that we have not been able to name it specifically. It is hoped this figure may assist collectors in finding it again, when it may be grown for the leaves and be studied in order to discover its affinity, whether this be with *G. jonquilliodorus* of the Cape Flats, or with *G. vaginatus* of the Riversdale and Knysna Divisions. Note the slender stem with its three sheathing leaves, somewhat after the manner of the *Restiaceae* or " reeds " of the Flats, among which it probably grows, and there has escaped the notice of collectors.

3. GLADIOLUS STANFORDIAE, L. Bolus, named after Miss K. C. Stanford, a successful cultivator of " bulbous " plants. The specimen depicted here was collected by Miss M. M. Page near East London in February, 1920, and flowered at Kirstenbosch the following year. Miss Page found it " common on the veld round East London." The species reaches a height of about two feet.

4. GLADIOLUS GRACILIS, Jacq., was grown in Europe more than a hundred years ago, and was figured by its god-father, Jacquin, in that fine Austrian work, the "Icones Plantarum." Certainly the name was well-bestowed by him, and Miss Page in her beautiful drawing renders

Painting: M. M. Page.

PLATE II.

1. Gladiolus crassifolius, Baker.
2. Gladiolus sp.
3. Gladiolus Stanfordiae, L. Bolus.
4. Gladiolus gracilis, Jacq. — natural size.

Painting: M. M. Page and B. O. Carter.

PLATE III.

5. GLADIOLUS PAGEAE, L. Bolus.

6. GLADIOLUS COCCINEUS, L. Bolus

homage meet for this graceful creature — with its wire-like stem and quiet charm of grey-blue flowers, few and loosely spaced. It is, or used to be, common on the Cape Peninsula and in the Caledon Division, flowering in July and August.

PLATE III.

5. GLADIOLUS PAGEAE, L. Bolus, one of the flaming "Dragon-heads" was collected by Miss Page in Basutoland at Thaba Tsueu at an altitude of 5500 feet, growing among rocks on a mountain-side. Corms flowered in Mr. Pillans' garden in March, 1921. The species appears to reach a height of two feet.

6. GLADIOLUS COCCINEUS, L. Bolus, flowered at Kirstenbosch during June of last year from corms sent by Mr. W. H. Stokes from Paulington in S. Rhodesia. Reaching a height of about four feet and with as many as nine richly coloured flowers open at one time this is one of the finest additions to the horticultural world among the many that have been displayed in our National Botanic Gardens.

— L. BOLUS.

The Cultivation of South African Gladioli.

LIKE various other typical South African genera with a large number of species, the distribution of Gladiolus is spread throughout all the Provinces of the Union, and in this case into Angola, Rhodesia, and up to the Mediterranean region. The Cape Province is richest in number of species, and, as is quite natural under widely different conditions, they are in the main very distinct from those native to greater heat combined with increased humidity and soil moisture. The one is characterised by wiry leaves and stems and delicately textured flowers, and the other by broader thicker leaves and stems, and larger flowers. The locality of the species is a guide, in a general way, as to whether it is a summer-flowering or a winter-flowering species. It does not however tell us if it is a swamp, or a streamside, or a waterfall plant, or an ordinary dry land plant, that is, flourishes under the soil moisture only of the actual rainfall of its locality. In so far as cultivation at the Cape is concerned, it is clear the species of the Free State, Transvaal, Natal, and Rhodesia require an abundance of moisture and heat, as well as a rich loamy soil, as connoted by their robust and vigorous growth. These requirements are most easily secured under open air conditions during our summer, when they provide a succession of blooms to most of the species native to the Cape.

In looking up the progenitors of the garden strains of Gladioli it was soon obvious that out of the many crosses effected about a century ago, only those from the above class or type have continuously advanced under the conditions and cultivation of the northern hemisphere. The *Gandavensis* and *Brenchleyensis* strains are reputed to be derived from *G. psittacinus* and *G. cardinalis* crosses. Certain it is that for some decades now neither strain has shown any influence of our "Waterfall Lily," *G. cardinalis*, in markings, leaves, or conformation of inflorescence or plant. If it was ever used, its influence was early lost. The improvement effected in garden strains up to a quarter of a century ago is most likely to have been by selection, and inbreeding with a natural "break," or crossing with one or other of the closely allied species to *G. psittacinus*, as *G. dracocephalus* or *G. Leichtlinii*.

At various times numerous crosses are recorded between Cape species, mostly with scented flowers. The resultant progeny however petered out very early, whether from sterility or difficulty of propagation is not apparent.

G. ramosus said to be a cross between *G. cardinalis* and *G. oppositiflorus*, still subsists as a small collection of varieties. The present day strain is likely to consist largely of *G. Spofforthianus* blood, a cross between *G. cardinalis* and *G. blandus*, with the last dominant.

G. Colvillei, raised from *G. tristis var. concolor* crossed with *G. cardinalis*, exists mainly as *G. Colvillei albus*, a white variety forced for cut flowers by florists. My memory of it is that it is practically pure *G. tristis*, another instance of the ineffectiveness of *G. cardinalis*, although its influence may possibly be seen in the two coloured varieties of *G. Colvillei*. Sometime in the nineties of last century *G. Lemoinei* came out as a cross between *G. gandavensis* and *G. purpureo-auratus* providing a prolific strain with the purple and clawed hood of the last. A little later *G. Lemoinei* was crossed with *G. Saundersii* resulting in the strain known as *G. Nanceianus* of gardens.

About the same time Max Leichtlin of Italy made

hybrids between *G. Gandavensis* and *G. Saundersii*, a superb species from Natal. The result has been the biggest advance ever secured in the Gladioli, an increase in the size of flower, in expansion of the segments, and in brightness of colours. These hybrids were developed and commercialised by Childs of New York, as *G. Childsii*. Simultaneously development in Canada, obviously based on the same hybrids, has yielded "Groff's Giants."

The latest development on a large scale has been derived from *G. primulinus*, the "Maid of the Mist" from the Victoria Falls, and garden varieties. Its development has been rapid, and the strain now consists of many varieties of quick and healthy growth, and with charming and graceful blooms.

The outstanding feature in all this development, from the cultivator's point of view, is that it is based on naturally moisture-loving, and even swamp species.

The cultivation of the wild species from which these strains have been evolved, as well as the closely allied species, is very simple. Plant out during September or October in any good well drained garden soil. Trench the soil, and fork in a dressing of bone meal and quite rotten manure. Plant the corms four inches deep, and when growth is through the ground water freely until flowering is over. During flowering light doses of a complete fertiliser, or sulphate of potash only, will prove beneficial. When growth has died down the corms should be lifted carefully so as to retain all the spawn, or bulblets, which are produced freely by many species. Dry them thoroughly in shade, rub quite clean, and store in a dry cool room.

Without giving a list of names, this class may be recognised by the large corms up to 2½ inches diameter, thick stems 3 to 5 ft. high, and broad rigid leaves up to two inches wide.

In the Cape species there is a much greater variation in the type of plant and flower, reaching the extreme in the slender wiry stems and distinctive form of flower in *G. recurvus*, *G. spathaceus* and *G. debilis*. A further distinct feature of numerous species is the powerful yet pleasing scent. In *G. hirsutus*, *G. grandis*, *G. tristis*, *G. recurvus*, *G. maculatus*, and *G. odoratus*, the perfume is such that the scented breeze is very often the first indication of their presence in the vicinity. At the present time the hunt of the universe seems to be for scent in the Gladioli. Whether the scent of this type can be combined with the present day garden types is, to me, very doubtful. Whether it is indissolubly linked with the brown or greyish colours in the above species, or not, has yet to be proved. Certain it is they are the most powerfully scented of the genus. I am told that *G. tenellus* is scented, and that *G. alatus* has a lovely almond scent.

With plants of such diverse forms as found in the Cape species it is natural that the conditions under which they are found wild should vary considerably. After trying various ways the simplest means to indicate requirements seems to be to tabulate the species under the approximate conditions of soil and moisture, at any rate as far as experience and limited knowledge permit.

1. Streamside or Swamp Plants.—*G. hastatus*, *G. Pappei*, *G. tristis*, *G. splendens*, and I judge *G. Stanfordiae*.
2. Wet or inundated sandy Flats.—*G. biflorus*, *G. villosus*, *G. Bolusii*, *G. inflatus*, *G. formosus*, *G. callistus*.
3. Sand Flats.—*G. recurvus*, *G. hirsutus*, *G. alatus*, *G. cuspidatus*, *G. erectiflorus*, *G. Rogersii*, *G. orchidiflorus*.
4. Hillside, sandy humus.—*G. debilis*, *G. spathaceus*, *G. sanguineus*, *G. brevifolius*.
5. Hillside, loamy soils.—*G. gracilis*, *G. maculatus*, *G. grandis*, *G. blandus*, *G. angustus*, *G. tenellus*.
6. Wet ledges or Waterfalls.—*G. cardinalis*.

Most are rigidly confined to these conditions; some, with the usual adaptability of many South African plants, are found on more than one, or where two soils may intermix; others may have lime, salt or brack, or acidity present in a pronounced degree. Singular peculiarities have still to be learned. The majority of these species have never been established under cultivation; so that the following are suggestions only, and not actual experience.

For Nos. 1 and 6 use a compost made up of 2 parts leafmould or peat, and one part each of sand and loam; stand the tins or pots in saucers of water, and give copious waterings and syringings daily during growth. *G. splendens*, *G. Stanfordiae*, and *G. cardinalis* are, or almost are, evergreens, so only begin to withhold water if the plants show signs of going to rest. The other species have a decided resting period, but are never baked dry, except perhaps under prolonged drought.

No. 2—use equal parts sand and leafmould or peat. During growth treat as above, but when it is completed stand out of water in a cool shady place.

No. 3—two parts of sand and one of leafmould or peat in an open bed, or plunge receptacles in ground. Supplement the rainfall as required; and allow to rest *in situ*, or store in a dry warm place.

No. 4—equal parts of sand and leafmould or peat in the open ground or tins; water, and store as last.

No. 5—use two parts loam and one each leafmould and sand. Water to maintain even moisture throughout growth and flowering; allow to rest *in situ* or store dry and warm.

The growing period of this section commences in March and April, and is completed in most cases by the end of November; *G. cardinalis* and *G. Pappei* in January, *G. splendens* and *G. Stanfordiae* in January and February. Under pot cultivation the corms should be shaken out and repotted by early April, and thereafter water applied as necessary. Bone meal, or bone and superphosphate may be used, but any other fertiliser I should be chary of using. Humus may be supplied as well rotten manure, and leafmould or peat may be half and half.

Many species of this genus increase rapidly from "spawn" around the corms, which may be sown or planted out as seedlings.

The stock of all can be quickly increased by seed, which generally is produced freely by most species. A light sandy soil should be used in seed sowing for all types, and when once germinated the seedlings should be kept going as long as possible — all the year if they will — so as to reach the flowering stage quickly. If seedlings are too thick they can be safely transplanted or pricked off to allow of space for development. Care should be exercised and close attention given to moisture. Seed of the Cape species should be sown in March, and those of the other Provinces, etc., including the eastern species of the Cape, during October.

Corms collected from the wild should be planted out in prepared soil as soon as possible, and treated as for growing plants in the same stage. Very many of the Cape species resent disturbance and take a season or two to recover.

J. W. MATHEWS.

Kirstenbosch,
November, 1928.

Book Review.

"NOTES ON MESEMBRIANTHEMUM AND SOME ALLIED GENERA" by H. M. L. Bolus. Part I. Cape Town: Specialty Press 1928. pp. 156, 21 coloured and numerous half-tone illustrations. Price 10/0 in paper cover, 13/6 in cloth-gilt: post free.

This book presents some of the results of the study of the old aggregate genus Mesembryanthemum which has been carried on at the Bolus Herbarium for the last twenty years. The greater part of it has appeared in scattered form in "*South African Gardening*," and the coloured plates and some other matter were first published in last year's issue of the "JOURNAL OF THE BOTANICAL SOCIETY."

It is common knowledge among the amateurs of this most fascinating group of plants that the old genus Mesembryanthemum has recently been divided by botanists into a number of smaller genera, many of them well characterised by vegetative form as well as by the structure of flower and fruit. This book makes accessible to the amateur in interesting and popular form some of the principles upon which this division has been based: and the excellent illustrations of examples of some of the more noteworthy genera — Lithops, Conophytum, Gibbaeum, Glottiphyllum and so on — assist greatly in clearing up some of the difficulties of the subject. To the botanist also, this part of the book is of considerable value, though a more complete presentation of the characteristics of all the new genera would have been welcome: however, such is the state of flux of the systematics of the Mesembryeae at present that no general account may be possible. The Cape Peninsula genera are analysed and a list (but no description) of the different species is given. The book concludes with descriptions of a hundred new species, of which 66 are published for the first time: and this feature alone will indicate the wealth of the material and the intensiveness of the study which is being carried on by Mrs. Bolus and her staff.

Much work on the group is also being done in Europe, especially by Mr. N. E. Brown and Dr. Schwantes. The work of the Bolus Herbarium, however, has the obvious and enormous advantage in the ready accessibility of living material in the field and in the rich collections of the National Botanic Gardens at Kirstenbosch and Whitehill. In such a group of succulent plants this advantage is inestimable: and the necessity of working almost entirely with dried material or with plants cultivated in green-houses is a serious handicap to the European investigators.

The illustrations are examples of the work of the late Miss M. M. Page and Miss B. O. Carter. The Bolus Herbarium possesses many hundred colour and monochrome drawings of Mesembryeae by these artists, some of which have been published. It is greatly to be hoped that some benefactor will come forward with the funds necessary for the publication of a comprehensive illustrated monograph of "Mesembryanthemum," for which the Curator and staff of the Bolus Herbarium are steadily preparing.

The Botanical Society of South Africa.

ANNUAL REPORT, 1927.

The Council has pleasure in submitting the Fifteenth Annual Report of the Society.

MEMBERSHIP.—The Membership of the Society stands at:—

Life Members	68
Family Members	60
Ordinary Members	522
Associates	353
Total	1,003

which shows an increase of 56 as compared with last year.

ANNUAL GATHERING.—The Annual Gathering of Members at the National Botanic Gardens, Kirstenbosch, was held on Saturday, October 22nd, and was very well attended. Lady Phillips received the guests on the lawn, and welcomed those present on behalf of the Council. Professor Compton, the Director of the Gardens, addressed the gathering, after which tea was served.

MEETINGS.—The Council for the year was elected as follows: President, the Right Hon. Sir James Rose-Innes, P.C., K.C.M.G.; Vice-Presidents, Sir Lionel Phillips, Bart., the Hon. Sir Lewis Michell, C.V.O., and Sir Max Michaelis; Members of the Council, Sir Drummond Chaplin, M.L.A., Professor Adamson, Mrs. F. Bolus, Mr. W. Duncan Baxter, Professor Compton, Mrs. Carter, Mr. F. E. Cartwright, Mr. W. A. Eaton, Miss D. Fairbridge, Mr. P. Stuart Horne, Dr. Bennie Hewat, Mr. W. de N. Lucas, Mr. H. T. Twentyman Jones, Dr. Lilian Robinson, Mr. H. C. Starke, Miss E. Struben, Mrs. H. G. Van Zijl, Major G. B. Van Zyl, M.L.A., Mr. Walter Webber, and Miss F. M. White. Mr. Walter Webber having resigned his position as a member of the Council, Mr. P. Ross Frames was duly elected in his place. Four meetings of the Council were held during the year.

JOURNAL.—The thirteenth volume of the Journal of the Society was published in December. The thanks of the Society are due to Professor Compton, who undertook the duties of Editor, also to the Cape Town University for having supplied the original paintings for the coloured plates which were published in this volume, and formed a very attractive addition to the Journal. Letters of appreciation were received from various sources. One member, writing from England, says: "Now at last we can get an intelligent idea of the family of Mesems.; the drawings and descriptions are beyond praise. We are all hoping this is the beginning of a series."

DR. LOTSY.—The Council of the Society entertained to luncheon Dr. J. P. Lotsy, the eminent Dutch botanist, on April 27th, 1927. Dr. Lotsy was on the eve of returning to Holland after an extensive tour of South Africa. Miss Lotsy and Dr. Goddijn were also present at the luncheon. Sir Drummond Chaplin presided, and General Smuts delivered a speech.

FINANCIAL.—The audited financial statement accompanies this report, from which it will be seen that the sum of £458 16s. 9d. has been available for the purpose of augmenting the funds of the National Botanic Gardens, in addition to which the Society voted a sum of £300 from its Life Members' Fund towards construction work to be undertaken in the new Succulent Garden.

LOCAL NATURE RESERVES.—During the year the Society has addressed letters to Magistrates in a number of centres, urging them to take steps to rouse local interest in the establishment of local reserves for the cultivation of flora of the district, and satisfactory response has been received from several quarters. Near Cape Town we already have the Upper Kirstenbosch Nature Reserve. At Queenstown part of Madeira Kop has been granted to the local Horticultural Society for the purpose of a wild flower reserve. At Hermanus the isolated kopje near the town has been reserved for the same purpose. At Caledon the Municipality is considering the establishment of a wild flower reserve on the Park above the town. At Montagu and Bloemfontein, movements have been started in this direction. At Ceres, Malmesbury, Darling, and Tulbagh, to name only a few places, there is urgent need for the establishment of nature reserves if these districts are not to lose their reputation as wild flower centres.

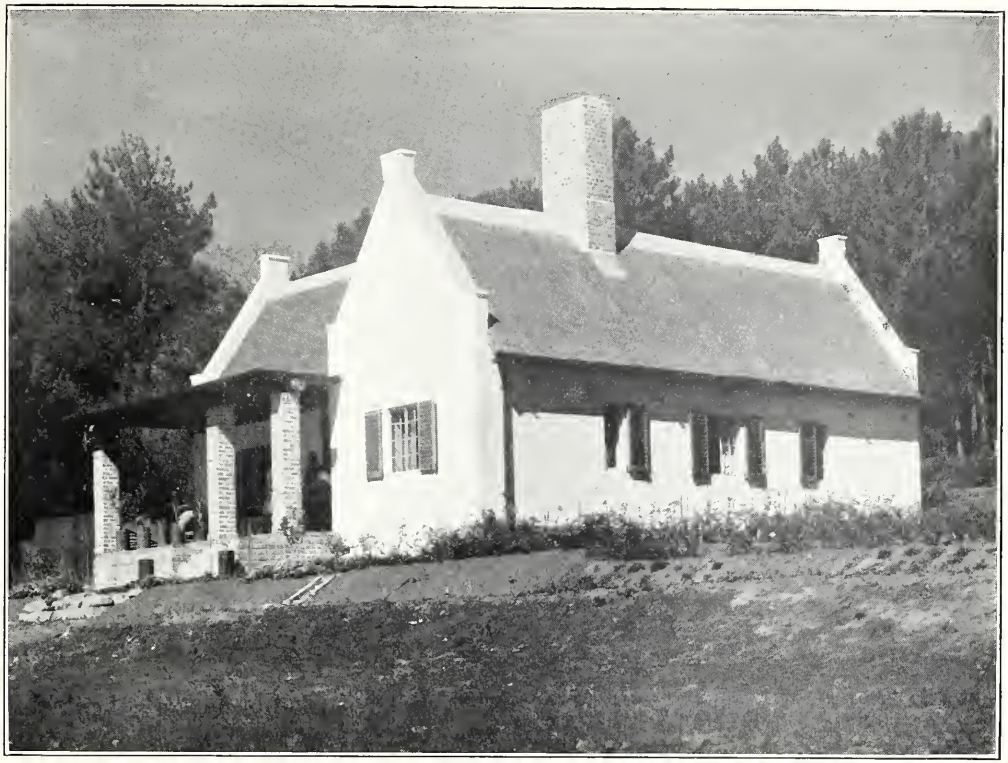

Photo: *R. H. Compton.*

PLATE IV.

A. The new Curator's House at Kirstenbosch. B. The new Nursery Buildings at Kirstenbosch.

CAPE NATIONAL PARK.—The Society is collaborating with the National Society, the Wild Flower Protection Society, and the Mountain Club, who called a Conference to promulgate a demand for the establishment of a National Park in the Cape Province.

KIRSTENBOSCH.—During the past year, as in previous years, many new species have been grown and flowered at Kirstenbosch. These have been described and illustrated in a series of articles contributed to "South African Gardening." Among the novelties have been species of Gladiolus, Freesia, Moraea, Homeria, Nemesia, Stapelia, and Pelargonium, all of considerable horticultural value, as well as of great scientific interest. Members and their friends who have sent these plants to the Gardens are to be congratulated upon having provided so much new material for the gardener, as well as the botanist. It is hoped that the coming year will yield an equally satisfactory report, and that members will not relax their efforts, and will realise that there are still endless floral treasures in South Africa unknown to science, whose avenue to fame leads through Kirstenbosch.

APPEAL FOR NEW MEMBERS.—It must be constantly borne in mind that the only means which this Society has of benefiting the National Botanic Gardens is by augmenting the membership roll, and thus increasing the yearly grant. Although it is gratifying to report a fairly substantial increase in membership, it is still necessary to emphasise that the Gardens are in urgent need of funds for their maintenance and development. Members are urgently requested to interest their friends in the work at the Gardens, and to point out the privileges attached to members, thereby inducing as many as possible to become members of the Society. The Hon. Secretary will be pleased to receive names of those who it is thought might interest themselves in the Society's welfare.

The Society has to express its indebtedness and hearty thanks to Mr. R. L. McDonald for auditing the Accounts of the Society; to the City Council and South African Association for the use of rooms for the purpose of meetings; also to the Press for their valuable assistance in reporting the affairs of the Society.

LIONEL PHILLIPS.
Chairman.

BOTANICAL SOCIETY OF SOUTH AFRICA.

BALANCE SHEET as at 31st December, 1927.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Life Members' Reserve Fund.			Union of South Africa 5% Loan,		
Balance—1st January, 1927,	580 0 0		1929-39	300 0 0	
Added during year	100 0 0		Accrued Interest	4 7 1	
		680 0 0			304 7 1
Sundry Creditors		110 19 10	Cape of Good Hope Savings Bank	369 19 11	
Subscriptions paid in advance		36 13 1	Accrued Interest	18 8 1	
National Botanic Gardens, Kirstenbosch—					388 8 0
Surplus for year 1927		458 16 9	Sundry Debtors		26 2 6
			Cash in Bank		567 12 1
		£1,286 9 8			£1,286 9 8

Audited and found correct,
(Signed) R. L. McDONALD,
Hon. Auditor.

Cape Town,
27th February 1928,

(Signed) LIONEL PHILLIPS,
Chairman.
(Signed) H. T. TWENTYMAN JONES,
Hon. Treasurer.

List of Members of the Botanical Society.

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary. P.O. Box 267, Cape Town.

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ADAMSON, PROF. R. S.
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Murray, Miss L. F.

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Peters, L .E.
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Philip, W. A.
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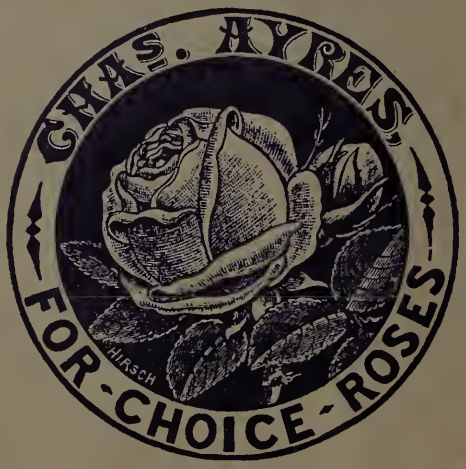

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OTANICAL SOCIETY

OF SOUTH AFRICA

Edited by R. H. COMPTON, M.A., F.R.S.S.Af., Director of the NATIONAL BOTANIC GARDENS :: :: :: KIRSTENBOSCH :: :: ::

Part XV. 1929

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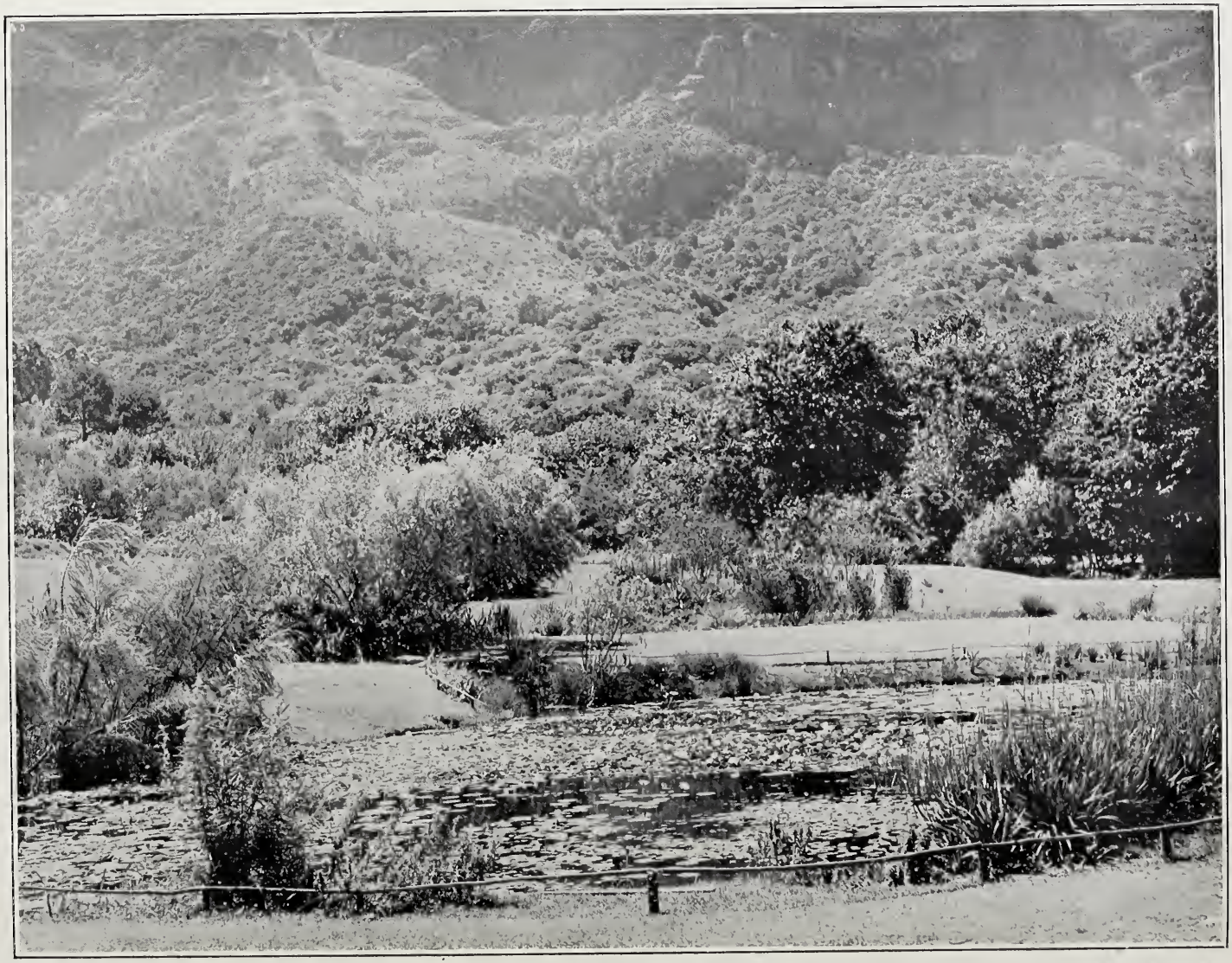

PLATE I. The Lawn and Pond at Kirstenbosch. *Photo: A. Elliott.*

The Journal of the Botanical Society of South Africa.

EDITED BY R. H. COMPTON.

PART XV. 1929

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Haworthia (Drawn by Miss W. F. Barker) .. .. Plate III

News and Notes.

THE Membership of the Botanical Society continues to increase, as will be seen from the following table.

	Life.	Family.	Ordinary.	Associates.	Total.
1914	33	22	264	33	352
1915	46	26	263	32	367
1916	49	26	264	45	384
1917	46	24	249	53	362
1918	49	28	281	78	436
1919	50	38	320	84	492
1920	54	45	384	237	720
1921	54	48	407	287	795
1922	55	52	418	301	826
1923	59	50	405	269	783
1924	62	57	455	313	887
1925	62	58	462	330	912
1926	65	60	481	341	947
1927	68	60	522	353	1003
1928	66	54	581	345	1046

* * * * *

This growth is matter for satisfaction, and also for acceleration. The increasing degree of development at Kirstenbosch necessitates an increasing expenditure: and an increase in membership of the Society is the way to meet this need. Every subscription helps, not only by its intrinsic value, but also as an indication of public support to the Government and local Councils. If Members of the Society would use their influence as actual subscribers to enlist new Members, then the roll of the Society would show the geometrical rate of increase which the Gardens need.

* * * * *

Construction work in the new Succulent Garden at Kirstenbosch has made considerable progress during the past twelve months, and the first section of the work approaches completion. The cost has been defrayed entirely by grants amounting to £600 from the Life Members Fund of the Botanical Society, and the Succulent Garden is the biggest piece of development at Kirstenbosch which has hitherto been financed from this source. The rock work has several novel features, one of the most striking of which is the provision of pavement work for the reception of Conophytums, small Crassulas, Anacampseros etc. The condition of the succulent plants in the Garden shows great promise of success in cultivating this most interesting class, which presents special difficulties in the climate and soil of Kirstenbosch.

* * * * *

Members of the Botanical Society may perhaps be reminded that the subscriptions of Life Members are paid into a special fund which is allowed to accumulate and is not granted annually to Kirstenbosch as is the case with the subscriptions of other classes of Membership. This Life Members Fund is used, by special votes of the Council of the Society, for special and definite pieces of development and construction work in the Gardens. This wise provision has made it possible for certain important pieces of development to be carried out without curtailing the limited funds available for maintenance, thus helping to solve what has been the chief financial problem of the Gardens. As a result of the grants made for construction work in the new Succulent Garden, the Life Members Fund is considerably depleted, and many new Life Members will be necessary before further grants can be made. The minimum subscription is £25.

* * * * *

The area on the north side of the Fern Dell at Kirstenbosch has for several years possessed a satisfactory system of stormwater drainage, and now a beginning has been made with the provision of drainage on the south side and in the Cycad Amphitheatre also. The old office has been demolished and the old Nursery dismantled, and it is now possible to include this area in the general scheme of development of the Gardens. Large pipes have been laid along the whole of the main drive, with branches up the Dell and along some of the paths in the Cycads and the Horseshoe Path; and this work will be continued to completion. Following this permanent paths in cobbles and gravel, according to circumstances, will be constructed, and the area will be planted with suitable indigenous plants to link up the Dell with the Protea Garden.

* * * * *

The event of the present year from the scientific point of view was the visit of the British Association for the Advancement of Science to South Africa. On a later page is an account by Professor Adamson (of the University of Cape Town) of the various activities of

the Botanical Section. A gratifying feature was the enthusiastic interest taken by the visiting botanists in Kirstenbosch and Whitehill. The official excursion to Kirstenbosch was unfortunately spoiled by rain—the only rain of the week; but many members took other opportunities of visiting the Gardens and all expressed the greatest interest and appreciation of what is being done.

* * * * *

With regard to the Karoo Garden at Whitehill, the Editor trusts that he may be forgiven if he quotes a letter by one of the visiting members of the British Association and published in the London "Times" of 20th August 1929.

GARDENS IN SOUTH AFRICA.

To the Editor of the Times

Sir,— The Botany Section of the British Association has just completed a series of visits to places of botanical interest in the Cape Province. Of all the places visited in this wonderland of flowers, none has raised greater enthusiasm than the National Karoo Gardens, Matjesfontein, and my purpose in writing is to call attention to this opportunity of seeing unique gardens set in the fascinating surroundings of unspoilt nature. All visitors from England who can find pleasure in real natural beauty should endeavour to include this spot in their round of visits. Matjesfontein is reasonably easy of access from Cape Town, and the hotel accommodation is good.

The Gardens have only recently been established by the energy of Professor R. H. Compton and of his tireless curator, and they are therefore not widely known, but I hope their merits may be the better known as the results of the publicity which your columns can afford them.

Yours faithfully,
G. W. Olive.

British Association for the Advancement of Science,
Cape Town, July 31.

* * * * *

As a result of this letter, which was reproduced in South African newspapers, there has been an increase in the number of visitors to the Karoo Garden. The Hotel Milner at Matjesfontein provides convenient accommodation. Whitehill is three miles away, and the Karoo Garden adjoins the railway station. There is a train scheduled to leave Matjesfontein at 8.57 a.m. daily, and one returning from Whitehill at 4.28 p.m. To reach the Garden by car, it is necessary to turn to the right along the main road from Matjesfontein along a rather rough track which leads along the north side of the railway to Whitehill station. It is hoped that the Laingsburg Divisional Council will be willing to put this road in good condition. There are no refreshments available at Whitehill and visitors should bring their own. The Curator, Mr. J. Archer, who lives at Matjesfontein, will give visitors any advice and assistance in his power.

* * * * *

A general account of the vegetation of the Karoo, with special reference to the Matjesfontein and Whitehill area, appears in this Journal. The Director will be glad to send to anyone interested a typewritten list of the flowering plants and ferns so far recorded from this district, including the Witteberg range of mountains which is so conspicuous a feature of the landscape.

* * * * *

Miss Phyllis Barnes, who held the Edward Muspratt Solly Scholarship at Kirstenbosch during 1928, was appointed as an assistant in the Bolus Herbarium at the beginning of 1929.

* * * * *

The Edward Muspratt Solly Scholarship for 1929 was awarded to Miss W. F. Barker, B.Sc., a former pupil of the Girls High School, East London, and student of Rhodes University College, Grahamstown. Miss Barker had a successful University career, obtaining First Classes in her major subjects, Botany and Zoology. During her tenure of the Scholarship she has been engaged in a study of the genera Lachenalia, Haworthia and Apicra, making use of the abundant living material of these genera available at Kirstenbosch and the collections in the Bolus Herbarium. An article and plate by Miss Barker on Haworthia appears in this issue of the Journal of the Botanical Society.

* * * * *

The genus Haworthia affords many attractive subjects for rock-gardening, and the article by Mr. Mathews, Curator of Kirstenbosch, in the present Journal will be welcome to growers of these interesting plants. They have a great advantage in a considerable degree of robustness, resistance to attack of fungi and insects, and tolerance of a wide range of soil and climate, and are probably the easiest of all succulent plants (with the exception of the American Cactaceae) to grow successfully in very varied conditions.

In this issue of the Journal is published an article by Professor Adamson on the vegetation of the South Western Region of the Cape Province: this gives a brief outline of the plant associations into which our Cape Coastal flora groups itself in response to variations in the environment. It will be of interest to those who are accustomed to think of the flora as a congeries of individual species to read an article written from the more sociological point of view, as it were, and dealing with the plant communities as wholes. For just as human beings organise themselves into societies, so plants of the most heterogeneous kinds organise themselves into definite though plastic formations and associations: the study of these integrating groups being called ecology.

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Kirstenbosch has enjoyed considerable immunity from bush-fires for several years, the last outbreak of any size being in May, 1922, when practically the whole of the mountain slopes above the Gardens were burnt by a fire which originated outside the estate. There have been minor outbreaks since, which were suppressed before serious damage was done. Unfortunately on Nov. 3rd a fire, the cause of which is unknown, broke out in the area of high Protea scrub behind the Gum belt and swiftly burnt almost the whole of the buttress between Nursery and Skeleton Gorges, the north side of Nursery Gorge alone being saved. The fire burnt among the old pine plantations on the top of Castle Rock during the night and next morning a change of wind brought it rapidly down the slopes towards Kirstenbosch and Cecilia Plantations. Renewed efforts were made to intercept it, and fortunately rain fell and finally extinguished a fire which had caused great damage and which had even more disastrous potentialities.

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Professor Compton, Director of the National Botanic Gardens, has been awarded a Visitor's Grant by the Carnegie Corporation of New York to enable him to study Botanic Gardens and National Parks in the United States of America. He and Mrs. Compton are leaving in December for San Francisco, and will visit the Botanic Gardens at Peradeniya, Singapore and Buitenzorg en route. They will spend three months in the U.S.A. and will return to South Africa at the end of July. During Professor Compton's absence his administrative duties in the Gardens will be carried on by a sub-committee of the Board of Trustees; and Mr. W. T. Saxton will act as his substitute in the staff of the Department of Botany in the University of Cape Town.

Professor Adamson is also going on long leave in the second half of 1930, and Mr. Saxton will remain as his substitute. Mr. Saxton was one of the late Professor Pearson's students in the South African College, and has since held botanical posts in India and at Reading. He is known in the botanical world for his research work on Coniferae, including a valuable account of the life history of the South African genus Widdringtonia: and he is at present writing a book on the Conifers for the Cambridge Series of Botanical Handbooks.

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Another book in this series which is shortly to be published is on the Gnetales, the foundation of which was laid by Pearson, and which now sees the light thirteen years after his death. It was Pearson's brilliant research work on this group (which includes the celebrated *Welwitschia mirabilis*) which brought him international recognition as a plant morphologist.

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While Lady Warden of the Kirstenbosch Hostel, the late Miss N. de Jager founded a fund which was intended to assist necessitous persons who wished to study gardening or botany at Kirstenbosch. After her death, small additions were made to the fund, but the Committee felt that it would be impossible to obtain a sufficient capital sum to carry out Miss de Jager's original intention. They have therefore allocated the fund, as a memorial to Miss de Jager, to the provision of electrical fittings in the Harold Pearson Memorial Hostel. This will take effect when it is possible to instal an electrical supply at the Gardens.

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The installation of electricity at Kirstenbosch is a serious necessity, not only for the convenience of the residents, but also for the safety of the thatched buildings, now exposed to serious risks from lamps, candles, and fires. At the Bolus Herbarium, too, electricity is a necessity for heating purposes in order to save the valuable collection of specimens and books from damp, and also to enable work to be carried on to a later hour in winter. The expense of laying the mains has been the chief obstacle, but it is hoped that, owing to building developments along the Wynberg-Kirstenbosch road, the municipal supply may soon be brought near enough to the Gardens to render the installation practicable.

The Cape Argus recently conducted a competition for naming in order the "Seven Wonders of Cape Town." There were nearly 20,000 entries, annd Kirstenbosch was placed fourth on the list of votes. Table Mountain, the Aerial Railway and the Marine Drive were respectively first, second, and third. The increased interest taken by the public in the Gardens is reflected in the greater attention given them by the Press. Moreover, it is noteworthy that artists and photographers are finding increasing inspiration for their landscape work in the magnificent scenery of Kirstenbosch. The Cape Town Photographic Society, in its recent exhibition, had several Kirstenbosch studies of admirable quality; and Miss Dorothy Barclay's collection of water colours which was so successful recently contained numerous charming landscapes of Kirstenbosch and its glorious setting.

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Van Riebeek's Hedge of Wild Almond is one of the most interesting monuments of old times which Kirstenbosch — and indeed South Africa — possesses. It was planted about the year 1660 to demarcate the European settlement at the Cape and to serve as a barrier against the Hottentots, a large kraal of whom existed in the Hout Bay Valley. One end of the hedge was in the forests of Kirstenbosch, and probably the large Wild Almond in the Pelargonium Garden is one of the original plants. A long gap, created by cultivation in the 19th century, intervenes between this and the next tree, on the slope above the Succulent Garden. Thence an almost unbroken line of trees stretches athwart the slope to the crest of the Wynberg Ridge, along which it may be traced, with interruptions, for some distance on one or other side of the road. There also exists, what has not apparently been recorded previously, the remains of a double alignment or avenue of Wild Almonds leading from the crest of Wynberg Hill near the Herbarium obliquely downwards through the pines in the direction of Bishopscourt — which, it may be recalled, was Van Riebeek's own farm of Boscheuval: and this avenue was quite probably contemporary with the Hedge itself.

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The Wild Almond — really a member of the Protea family, *Brabeium stellatifolium*, — is an interesting choice for such a hedge. Its native habitat is along streamsides, and it was a bold experiment to plant it across a dry, sun-baked hill-slope. The experiment was completely successful, however, and Van Riebeek's Hedge has held its own, despite droughts, fires, and mutilation; and the selfsame trees that Van Riebeek planted are still flourishing, their enormous boles testifying to their age. Recently the dense scrub has been removed on either side of the Hedge, in the Kirstenbosch area, and broad belts have been planted with thousands of Watsonias of different species, providing a delightful spectacle in the spring and early summer, and rendering the Hedge more accessible and recognisable.

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We publish in this issue of the Journal two recent photographic studies of Kirstenbosch, by kind permission of Mr. A. Elliott, of Cape Town. One of these shows the Cycad Amphitheatre: *Encephalartos Altensteinii* in the foreground and *E. Frederici Gulielmi* behind, young trees of *Widdringtonia juniperoides* the Clanwilliam Cedar, *Virgilia capensis* the Keurboom, a Silver Tree, Watsonias, and as a background, Diamond Stream, Nursery Gorge, and the Contour Path.

The other photograph is taken on the Lawn, and shows the Water Lilies in flower in the pond, *Psoralea aphylla* on the left, *Salix capensis* the Cape Willow in the centre, and the forests of Skeleton and Window Gorges in the background.

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The Kirstenbosch Tea House has been taken over by new management, the lessees being Miss Browne and Mrs. Hodges. Light refreshments and lunches are provided at a moderate tariff. It is hoped that Members of the Society and their friends will patronise the Tea House on their visits to the Gardens, and so help to make a success of an establishment which is of great service to visitors, and which the Botanical Society itself did so much to found.

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For almost the whole of 1928 and more than half of 1929, Kirstenbosch was without a regular bus service, and visitors were considerably handicapped. However, in September, 1929, a regular service between Newlands Station and the Gardens was again started by the Claremont Taxi Garage. Six trips are made daily in each direction, at advertised times. Members of the Society are urged to support this service, as naturally its continuance depends on sufficient patronage. Information can be obtained from the proprietors, (phone Claremont 522) or from the Gardens' Office.

A short guide-book to Kirstenbosch has been written, and arrangements are being made for its publication by the Cape Peninsula Publicity Association, with a view to free distribution to visitors.

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The publication of a series of coloured picture postcards of Kirstenbosch has been under consideration, and Mr. J. B. Taylor has made a generous contribution towards the primary cost of production. These postcards will serve as a memento of the Gardens and at the same time as an advertisement for the Botanical Society.

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The coloured plates of Cape Wild Flowers published by the Wild Flower Protection Society can be purchased at the Kirstenbosch Tea House, where a complete set is available for inspection.

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The movement for the establishment of a National Park in the Western Province has received the support of numerous societies and individuals, among them the Botanical Society, which sent a considered reply to the questionnaire on the subject issued by the Natural and Historical Monuments Commission. The Commission is engaged in considering the matter, and it is hoped that definite steps may be taken before long. The question is one that involves many difficulties, but enlightened public opinion, as witnessed by the replies received by the Commission, is so strongly in favour of the National Park idea that every effort should be made to find a solution of the problem.

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Recent newspaper correspondence has revealed a great degree of antagonism to the caging of animals in so-called "zoological gardens." The conditions at the Groote Schuur Zoo have aroused protests for many years, and the Cape Town City Council and the Government have reached an agreement for their improvement. The details are not yet known, but it is clear that a perpetuation of the conditions of close confinement will meet with strong opposition. Nor will this opposition be on the grounds of sentiment and humanity alone. To construct and maintain a tolerably good "Zoo" at Groote Schuur would be a costly affair, and the cost of maintenance would probably have to be borne entirely locally. There already exists the National Zoological Gardens at Pretoria; and, just as in the case of Kirstenbosch, there is no room, financially speaking, in the country for more than one such national institution. Moreover, the Cape Peninsula can do much better than merely perpetuating a zoo, and at much less expense. The mere cost of maintaining a zoo for ten years would be sufficient to purchase a sufficient area as a Nature Reserve, stock it with animals, and provide it with the necessary surveillance.

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At Groote Schuur itself we can get a picture of the contrast between the two ideas. On the one hand there are the caged animals exhibiting all shades of feeling between restless misery and hopeless boredom, and incidentally costing considerable expense. On the other hand, the wildebeeste in the large paddock are probably better off than any zoo animals in the world; they are a pleasure to see, and their cost of maintenance, as far as one can judge, is trifling. Which is the better? And which ideal should we follow? Imprisonment, inhumane and expensive, or freedom at a fraction of the cost? The opportunity is at our very doors. Will not Cape Town do the big thing and the progressive thing? Smith's Farm has been mentioned in this connexion, and indeed it is difficult to imagine a more suitable site for a Municipal Nature Park. And this would be a unique attraction to visitors, who can see elsewhere much better "zoos" than the Cape Peninsula could ever afford to maintain.

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It may be thought that a Botanical Journal is outside its province in discussing such zoological matters; but it is not so. A Nature Park would not only serve the purpose of providing for animal life: it would preserve the native flora also. In fact, it may be said, as the result of bitter experience of non-enforceable wild-flower-protection ordinances, of public carelessness, of veld-burning, and of the destruction wrought by agriculture and forestry, that nature reserves are the only ultimately effective way of saving our flora. Therefore, botanists and those interested in the preservation of our flora should give every support to Nature Park schemes, even when these have had their origin on the zoological side.

The Vegetation of the South West Region.

As a sharply marked geographical type of vegetation, probably few regions are better known than the south-western Cape.

The general features are described and compared or contrasted with other regions in all the text books on geographical distribution. But while the features of the vegetation as a whole are thus well known, very little information is available in regard to the communities composing it or of the relations to the surroundings or to one another.

This lack of information can be traced to two main causes: the geographical situation, and, more importantly, the characters of the vegetation itself. Not only is the flora an exceedingly rich one as regards numbers of species, but throughout there is a decided uniformity of type as regards life-form and leaf size.

In few of the communities is there any definite dominant species or group of species. Further, large numbers of the species have limited geographical ranges, and communities on similar habitats in different parts are often found to have very different populations.

Three main types of community can be recognised, bush, forest, and marsh or swamp (vleis). Of these the first is very much the most widespread and constitutes what is regarded as the typical vegetation of the region.

BUSH.

This bush comprises large numbers of distinct communities but throughout there is a characteristic form and structure. Xerophytic shrubs or undershrubs with small hard evergreen leaves almost always predominate. The ericoid type of leaf is especially common and is found in a large number of plants belonging to a wide range of taxonomic groups. This high percentage of shrubs with very small leaves brings about a difference in general aspect as compared with the sclerophyll vegetation in other parts of the world with which this vegetation is usually grouped. The identity of the Cape vegetation with the sclerophyll has been carried to the extent of introducing names for communities; e.g. "macchia" etc. While the similarities are undoubted there are so many differences in detail that this importation of names seems inadvisable.

The communities are rarely truly closed and there is a general absence of definitely dominant species: they have large and frequently varying populations. Plants of social habit are infrequent. Detailed examination reveals the fact that the "areal percentages" of individual species are low as are also the figures for Raunkiaer's "valency," This is found even in the study of apparently uniform communities and is not the result of habitat or other local variations. When similar communities are compared in different places, even when little separated geographically, the degree of constancy of species is often very low.

The problem of "exclusiveness" (gesellschaftstreue) has not been studied in these communities, but comparative observations would suggest that the number of exclusive, and often very locally exclusive, species is large.

In spite of these characteristics, the communities have a quite definite physiognomy, and in any one the biological spectrum is definite. Indeed the life-forms provide one of the most convenient criteria for delimitation and especially for comparison of the communities from different localities where the species populations may be very different.

These characters of life-form and leaf size are exhibited both in relation to habitat and to succession.

Communities.

These characteristics of large constituent poulations and local floristic differences render any detailed description of the communities a matter beyond the scope of a short account. The area is large and the diversity very considerable. A full description of the main types is available in Marloth's "Das Kapland" which covers the whole area, though this was written before the concept of succession had become established in plant geography. For the communities of Table Mountain an outline account has been produced more recently (Adamson, Journ. Ecol. XV., 1927).

In the present short treatment it is obviously impossible to include every habitat or local variations. All that is aimed at is to outline some of the chief characteristics on very general lines.

The communities may be conveniently separated into two groups on a topographic and climatic basis: those on the lower slopes of the mountains, the valleys, and the plains, on the one hand, and, on the other, those of the upper portions of the mountains.

The first group occupies the country with limited rainfall, 12-30 ins. per annum; the upper regions have a heavier rainfall and a moister atmosphere owing to mists both in summer and in winter.

While the line of division is an arbitrary one, it is one that is readily recognised on most of the mountain ranges. The lower slopes are usually covered by talus or other detrital material. Very often cliffs form a boundary between the lower and upper regions. The altitude of the line of separation varies; it is lower near the coast.

Communities of Lower Levels.

Within the lower region groupings of the communities can be made according to the rainfall and the type of soil. The slopes of the mountains are the portions with the higher rainfalls (20 ins. or more). While the soil is varied in character, sands or soils with a greater or less admixture of sandstone material are especially common; the sand is derived from the weathering of the rocks that form the upper regions of the mountains. On such habitats the community that is to be regarded as forming the climax is a quite characteristic one though it exhibits a very wide range in floristic composition. This is a bush community which fully developed has three or more layers though none of these layers is as a rule quite continuous. The uppermost is made up of large bushes (or even small trees) which have rather hard xerophytic leaves typically flat and of moderate size. Members of the Proteaceae are especially characteristic here.

Below and between these larger plants are smaller bushes that very often have ericoid leaves. Along with these are many other plants of many forms. Restionaceae are abundant on sandy soils where they may form a continuous layer. On the finer grained soils they are rare or absent. Some true shade species are found in these climax communities.

The soil has a distinct surface layer of humus.

With variations of aspect and rainfall, this climax type of community shows all gradations from a dense thicket of shrubs 6-8 ft. or more in height to a rather open community of low bushes (3-4 ft.). It occurs on all types of soil, sandstone, sand, scree, granite, clay, etc., though of course, the characteristic species show differences on these different soils and in different geographic localities. For example, on the Cape Peninsula alone the character plants of the uppermost layer of the climax community are exceedingly varied: on the sandy flats and lowest slopes *Protea mellifera* is the most abundant; on clay soils on slopes *Leucadendron argenteum* is locally dominant; *Protea lepidocarpodendron* is the character plant of talus slopes on the north and west sides of Table Mountain, *P. incompta* on the east; *Protea grandiflora* occurs on the shallower soils; *Leucospermum conocarpum* on soils derived from the sandstone. In the southern part of the Peninsula *Leucospermum conocarpum* and *Mimetes hartogii* occur on sandstone kopjes while on the flatter parts with deeper sandy soils *Leucadendron decorum* is present.

The associated species shows also a very large range of variation. For example lists made of climax communities on the east, west and north sides of Table Mountain contained respectively 90, 90, and 97 species of flowering plants but of these only 18 species were found in all the examples. On the other hand in all their features of structure, life-form, and leaf size the communities were very similar. These communities are from localities very close together; if comparisons were made between examples from more widely separated regions these features become still more marked.

On the plains and hills with lower rainfall, 12-20 ins., a similar but more xerophytic and less complex community forms the climax. In the drier regions the differences of soil become more striking. On sandy soils the climax is very similar to that on the mountain slopes but with lower bushes and less completeness of layering. On clay soils the communities are distinctly more xerophytic. Though these soils may become water-logged in the winter, they become very dry and often baked hard on the surface in summer. The clays have less humus. The climax community is more open and more xerophytic. The Restionaceae, so characteristic of the sands, are quite absent.

In regions of still lower rainfall, 10-12 ins., simpler types of structure are found as the climax, either ericoid-leaved or other xerophytic bushes, or, on sands, restionaceous plants with occasional bushes. Large succulent plants, *Aloe spp.*, *Euphorbia spp.*, and others, may be a conspicuous feature. These can be looked upon as cases where the full development is checked and the end phase corresponds to one that is superseded in more favourable regions.

Where the rainfall is below 10 ins., communities of a different type are developed which are outside the immediate subject in hand.

While the communities of the kinds mentioned are the end phases of development or climaxes, over most of the region they are by no means abundant. Indeed, it is not too much to say that in many parts they are decidedly rare. This rarity is due in part to instability of habitat which limits development, and in part to destruction and inter-

ference. The latter are much the more important. Destruction has resulted from the activities of agriculture and of settlement, from wood-cutting, and from grazing, but by far the most potent and wide-spread agent has been and is burning of the vegetation. This destruction has resulted in the production of simpler and more xerophytic communities. These show a complete range of structure from a very simple open one to a more complex layered condition. The plants composing these communities are usually smaller than those of the climax and have smaller leaves or more xerophytic structure.

On sandy soils communities in which restionaceous plants predominate are frequent. Any attempt at description of these communities would extend far beyond the limits of space available, and only a few points can be mentioned.

On the drift sands in the plains or by the coast the stages of development can be traced and these are found to be parallel in many features to those seen in regeneration after fire. On these moving sands the absence of efficient sand binding grasses is worthy of note. The pioneer dune-builders are shrubs which are either prostrate or branch at the base. The general line of development passes from these through xerophytic bushes, Restionaceae, ericoid bushes, to the climax.

The exact series of stages in the regeneration succession varies very much upon different types of soil, and is further complicated, and the lines of development deflected, by destruction before the climax is re-attained. The effect of frequently recurring fires is to produce communities often very different from those in the primary succession. Not only are the species different but the proportions of the life-forms is changed. Geophytes and hemicryptophytes which are more or less protected from the effects of fire, become very much more abundant. As an example, *Bobartia spathacea* may be noted; this plant becomes exceedingly abundant and sometimes almost approaches dominance on the fine grained soils after fire. It forms communities associated with Tetraria and other tufted Cyperaceae in which few shrubby plants are found. At higher altitudes some of the larger species of Tetraria, (e.g. *T. thermalis* on Table Mountain), are also exceedingly fire resistant and spread largely when competition is removed.

Such communities become apparently stabilised where fires are frequent: the advance to further stages is slow owing to the impoverishment of the soil and the strong growth of the fire-resisting species, but if not disturbed, bushes do invade successfully and gradually assert themselves.

In some cases after fire, certain species become temporarily very abundant: these may be either plants previously present in the community which survive and spread rapidly for a time, or new invaders. Among the former are *Watsonia rosea* and other species. Communities containing large numbers of Watsonias on the mountain slopes are an almost certain indicator of fire. As an invader, mention may be made of *Aspalathus astroites*. This becomes very abundant on well-drained sandy slopes at the lower altitudes. It is a large bush and one which may attain complete dominance after fire. This dominance is reached in 1-2 years and is only maintained for a year or two. The community becomes invaded by other plants, Rhus, Pelargonium, Lobostemon, etc. which after a time drive out and suppress the Aspalathus. This happens though the newcomers are of smaller size.

In regions of 12-20 ins. rainfall, and especially on clay soils, an exceedingly characteristic community is present. This is one dominated by a single species, *Elytropappus rhinocerotis*, the Rhenosterbush. This plant with its grey green shoots with cupressoid leaves, covers great stretches of country. Indeed, rhenosterbush communities are far the most abundant of any one type in this region.

All residents in the country, farmers and others, are agreed that this plant is much more abundant and wide-spread at the present time that it was in the past.

In practically every case the communities dominated by rhenosterbush have arisen as the result of interference with, and destruction of, the original vegetation: the chief factors have been burning and overgrazing. The rhenosterbush regenerates and spreads very rapidly from seed after fire. It is avoided by stock.

These rhenoster communities in time give place to others but the change is slow especially in the drier regions and with grazing and periodic fires an apparent stability is attained. The community becomes rapidly established on derelict arable land, and the practice followed of allowing land to lie fallow after cropping provides a source of spread for the rhenosterbush.

While rhenosterbush communities are most characteristic of clay soils and regions of rather low rainfall, they do occur elsewhere. They appear after fire on sandy soils in the drier regions. On the mountain slopes with high rainfall the plant rarely attains to real dominance and the subsequent phases of development occur more rapidly. The Cape Town area provides good examples. Rhenosterbush becomes dominant after fire on the dry soils derived from granite or slate. On the western side of Signal Hill the

community is relatively pure and slow changing: while on the slopes of the mountain or of Devil's Peak where the moisture is greater, the plant hardly becomes truly dominant and is driven out after four to five years if no further fire occurs.

This community, which is very much the most extensive in this region, probably nowhere represents the original, or a truly stable vegetation.

Communities of Higher Altitudes.

The upper regions of the mountains have a climate that is very decidedly more moist; the rainfall is heavier and mists are frequent in winter and not infrequent in summer. While these mists cause practically no precipitation by the ordinary methods of measurement, experiments have shown that the vegetation, especially when tall, intercepts moisture to an extent that corresponds to a considerable rainfall.

While the floristic composition of the communities at the higher levels is very different from that of those lower down, there is a remarkable similarity in the general life-forms from sea level to the summits of the highest mountains. Notwithstanding the increased moisture the shrub or undershrub with ericoid leaves is everywhere characteristic and other xerophytic forms are also present.

The mountain communities show some differences in the distribution of life-forms: large bushes are few or absent and herbaceous or sub-herbaceous plants are more abundant. Restionaceae are especially abundant and often constitute a large part of the community.

The communities are less complex: the bushes are smaller and are often arranged in a single layer. The absence of dominants and the variety of species is quite as marked as lower down.

While there are very distinct local differences in relation to habitat, these upland communities exhibit a succession of life-forms. Development passes from open bush or herbaceous or grass like plants, to a reed-like phase with Restionaceae, then to an ericoid bush community that typically represents the climax. Local communities of simple structure are often stabilised owing to habitat limitations.

At the higher levels the soil, where stability is attained, contains much humus: this may form a definite surface layer. Bryophytes are often prominent in building up this humus layer.

On the highest parts of the mountains, exposure to wind, etc., and lack of soil are limiting factors and the communities are open. The shrubby plants are frequently prostrate and some attain the cushion habit.

FORESTS.

In the area under consideration, an absence of trees is a very striking feature. At present this treelessness is certainly greater than it was at one time. Not only did some of the upper layer of the bush communities attain tree stature but true forests, which are now confined to the deepest and most sheltered kloofs on the mountains, once extended much further over the slopes.

The forests here represent outliers of the vegetation that becomes fully developed on the central part of the south coast, in the Knysna-Humansdorp region, where the rainfall is distributed through the year. In the winter rainfall area forests only occur where the summer drought is mitigated by permanent streams or deep shady kloofs.

At the present time in this region forests are more abundant in the mountain kloofs. Along rivers they have been reduced in most cases to little more than a fringe of trees.

The forest communities differ in so many ways from the bush communities that it is difficult to regard them as genetically related. The life-form is different and the leaf both in size and character. Instead of the dull, small, often ericoid leaves of the sclerophylls, the forest trees have laurel-like leaves with a polished surface.

When fully developed the forest is a rather complex community: the main canopy is made up of a number of species that occur in association. The exterior is irregular not smooth. Below these are smaller trees which may form a continuous layer. Shrubs do not form a complete layer. Lianes, though not numerous in species, often form a distinct feature, festooning the larger trees. Epiphytes, mainly ferns, occur but are not numerous. The ground plants show great variation with conditions, ferns are abundant. Not infrequently, lack of light limits the amount very much.

Several communities of forest are recognisable, depending on local conditions of soil, moisture, and other factors. The structure and appearance of all are, however, very similar. These have been described for the Knysna forests and need not be repeated in detail. It will be enough to mention that *Cunonia capensis* is especially abundant where soil water is permanent; *Podocarpus latifolius*, *Olea laurifolia*, *O. capensis* and others in moist but less wet situations, *Ocotea bullata* and *Curtisia faginea*, the trees with the largest and least xerophytic leaves, occur here; in drier parts are *Cassine capensis*, *Olinia cymosa* and *Olea verrucosa*. *Podocarpus elongatus* and *Brabejum stellatifolium* often form forest zones along rivers.

The forest with its trees with laurel-like leaves is the climax of a developmental series. Several of the earlier stages can be recognised. These comprise communities of both trees and of bushes. These communities are found as zones around the margins of forests, in clearings and in openings in the forest itself, and also in stations in which forest at one time existed. Some of these are closely allied to the climax while others are very different both in structure and in composition.

Those stages that appear nearest to the climax are communities of the more xerophytic trees of the forest such as *Cassine capensis*, *Olea verrucosa* and others. These form less dense woods in which lianes, epiphytes, and the more hygrophytic elements of the undergrowth are wanting. Along streams are found communities in which *Brachylaena neriifolia* is the chief constituent: these are also communities of the same rank.

Communities further removed from the climax are those composed of trees with small leaves which cast a much less degree of shade: *Virgilia capensis* is the commonest and the most important example. It is worthy of note that the deciduous *Salix capensis* occurs in riverside communities of this kind.

The communities of bushes are exceedingly varied in composition in different localities, and a very few of the principal constituents are all that can be mentioned. The bushes are as a rule of rather large size and most of them are not strikingly xerophytic. Instead of the hard small leaf of the sclerophylls many have soft leaves of moderate size:— *Cluytia pulchella*, *Polygala myrtifolia*, *Podalyria calyptrata*, *Gymnosporia buxifolia* and others: others are more xerophytic in leaf-form, as *Metrosideros angustifolia*, *Phylica buxifolia*, and *Widdringtonia cupressoides*: a few have the laurel-like leaf of the forest trees, such as *Botryceras laurina* and *Cussonia thyrsiflora*.

The number of species in these communities is very large but with few exceptions they are less xerophytic in form than those of the sclerophyll communities. Some species, though not very many, do occur in both types. These are the more mesophytic of the sclerophylls, such as *Oftia jasminum*, *Pelargonium cucullatum*, *Osteospermum moniliferum* and others.

Associated with the bushes are many herbaceous plants and undershrubs which often have large leaves, e.g., many species of Pelargonium, *Senecio rigidus*, *Leonotis leonurus*, and many others.

The proof that these communities do represent stages in the regeneration of forest rests for the most part on comparative evidence. The time required for the passage from one stage to the next in the succession is long. This is especially so in the more advanced stages and in the establishment of the climax. The trees composing these forests are all of slow growth and some of them very slow.

Examples, however, can be found where young forest trees are becoming established under Virgilia or under bushes. Such examples taken along with the evidence obtained from geographical, topographical, and other sources leaves no serious doubt on the question.

The life-form, floristic composition, and habitats of the forest are distinct from those of the sclerophyll communities. They are best looked upon as constituting portions of a vegetation type dependent on a more equably moist climate. It may be mentioned that forests are absent even in kloofs in mountain ranges in regions of low rainfall. None occur with less than 25-30 ins.

The laurel-like leaves, the presence of lianes and epiphytes, and the rather hygrophytic undergrowth, completely separate these forests from the sclerophyll forests of Europe, America, or Australia.

Marshes and Vleis.

The fresh water aquatic flora and vegetation is dealt with in a separate chapter and little need be said of marsh vegetation. The general characters are exceedingly uniform everywhere: reed-swamps, passing to marshes largely dominated by Cyperaceae and so forth, occur here at the margins of permanent fresh water.

In this country, with its long dry season, many areas which are under water for the winter and spring, become completely dried up in the summer. In such places the typical swamp vegetation is lacking. The true aquatic plants become dormant and the exposed ground is covered with small plants which are annuals or truly amphibious perennials. In many cases on drying, considerable quantities of salts are deposited and even at long distances from the sea there occur plants which suggest maritime conditions: e.g. Salicornia, Frankenia, Statice, etc.

Among the fresh water communities, one may be given special mention, a community dominated by *Prionium serratum*, the "Palmiet." This plant occurs in and along slow-flowing rivers or streams. With its branching stems each bearing a tuft of leaves, the plant forms almost pure communities which extend from the bank into or even across rivers. The community is a pioneer one, though from its habit and habitat, it may persist for long periods. As soil is accumulated the palmiet becomes invaded and finally driven out by tall reed-like plants. Among these

Elegia verticillaris and *Leptocarpus paniculatus* are abundant. Later bushes or small trees appear, such as *Psoralea pinnata*, *P. aphylla*, *Metrosideros angustifolia*, *Salix capensis* and others. The ultimate phase would probably in time be forest.

Salt marshes occur at various points along the coasts. Those around Table Bay, the only accessible ones within this area, have been interfered with by drainage, planting and other causes. At present little more than the outer zonation and some of the driest communities can be made out. The areas, though of much floristic interest, are not instructive from a vegetational standpoint.

Changes in Vegetation.

Some of the outstanding features of the native vegetation have been outlined shortly, and the communities that represent the climax on the different habitats have been noticed.

In a country, relatively recently affected by European civilisation and thinly populated, it might be expected that the vegetation would be in its primaeval state. In the south-western Cape this is far from being the case. Practically everywhere the plant cover shows signs of alteration and change from its original form.

As a cause of this change, fire has been much the most important and widespread factor. The vegetation, and especially that on the mountains, is burned at frequent intervals. This practice has continued from the time of the arrival of the European, and probably was carried on on a small scale by the Hottentots before that time.

In spite of legal penalties and the obviously detrimental results, no diminution of fire damage is observable.

In the mountain regions the extent of burning is such that only small scraps here and there can be found where escape has been long enough to allow development of the vegetation to continue to its full or nearly so. The persistent burning has had a pronounced effect on the plant communities. Humus is destroyed and in many cases the whole soil is washed away. Those communities that exist are much simpler in structure and more xerophytic. The plants are small and often the community is quite open. Regeneration of course takes place but when, as often happens, fires follow one another at short intervals the bad effects are increased. After each fire in an area the time for regeneration is extended.

The plants existing on frequently burned parts are those that make little demand for soil or humus. At the higher levels especially, the shrubs suffer most, and after fires the proportion of geophytes and tufted plants which are partially protected, increases.

Erosion of soil is most marked in the regions of heaviest rainfall, and here, as the result of fires, the vegetation is most sparse and poor where exactly the reverse might have been expected.

The general result on the communities of burning is a simplification and impoverishment in variety. The case of the rhenosterbush has already been noticed. It is just an extreme and widespread example of a general trend of change.

As compared with fire the other agents of change have a small and local action. The introduction of alien trees has brought about very marked changes in the communities locally. Pines, and still more Australian species of Acacia, have attained complete dominance over the native flora in places. Another Australian genus, Hakea, is locally ousting the indigenous bush. But in most cases aliens have had little influence except in the immediate vicinity of settlements.

Grazing is a factor which has not been of very much importance in changing the vegetation in the south-west. The intensity of grazing on vegetation of this kind is necessarily not great. Improvement of feeding grounds is brought forward in justification of burning, but the fire is the destructive agent not the animals.

On the Karoo, however, overgrazing has had a big influence in places. The slow growing plants are destroyed completely and where the concentration of sheep is considerable the trampled ground is unfavourable to any regeneration. Large areas in the neighbourhood of watering places, farms, etc., have become deserts or merely support open communities of the "kraalbos," *Galenia africana*.

In the south-western Cape the extent to which the natural vegetation has been altered in the comparatively short period during which European occupation has lasted is remarkable. The ultimate condition cannot be fully estimated as yet, but that stabilisation of some simpler and less diversified type of community will be reached seems most probable. Along with this, as a necessary corollary, it seems certain that many of the peculiar features of the vegetation and of the flora will disappear unless some steps are taken to check the destructive forces.

R. S. Adamson.

The Vegetation of the Karoo.

It is impossible to frame a satisfactory definition of the word Karoo, either in terms of climate, soil, or vegetation. In different parts of South Africa the word Karoo is used to cover many distinct types of country. Plant geographers in South Africa have tended to adopt the term in a very wide significance, as expressing a type of vegetation: whereas in popular speech it implies chiefly dry sheep and goat country, as it did in the days of the Hottentots. The subdivision of the botanically vague "Karoo" into smaller and more accurate concepts is a matter of very great difficulty, and at present we are often at a loss to explain in terms of environment some of the most striking vegetational differences.

"Karoo" formations in the broad and popular sense occupy more than half of the area of the Cape Province and a small portion of the Orange Free State. Karoo is developed over practically the whole of the interior portions of the Cape Province, isolated from the coast by the high mountain ranges parallel thereto. These act by precipitating the moisture from the sea breezes, leaving the inland plains with only a comparatively casual rainfall. Although the coastward Karoo areas have for the most part an altitude of 1,500 to 3,000 feet, the mountain ranges which surround them form continuous barriers of 3,000 to 7,000 ft.: and there is rarely sufficient moisture left in the atmosphere after passing over these barriers to cause precipitation on the Karoo. The rainfall gradient on the lee of the mountains is extremely steep. Ceres, for example, situated in the angle of the Witzenberg and Hex River Mountains, has an annual rainfall of about 41 inches: whereas Worcester, only three or four miles from the Hex River Mountains, and on their lee-side, has only about 12 inches.

Great stretches of the interior of the Cape Province therefore have an erratic rainfall averaging from 4-12 inches annually, but frequently far below the average. For instance, at Whitehill the following figures have been recently recorded; (and in this same series of years the Koup districts have had even less):—

1923	5·38	inches
1924	2·98	,,
1925	7·29	,,
1926	3·27	,,
1927	2·52	,,
1928	3·20	,,

Much of even this small rainfall is of very little value as far as the vegetation is concerned. Rains of less than 0·15 inch scarcely wet the ground, and though the shallow-rooting succulents may be able to take advantage of them, the more deeply-rooting shrubs are unaffected. On the other hand, heavy rains and thundershowers bring up the annual average but do not produce a proportional effect on the vegetation owing to rapidity of run-off. The "effective" rainfall is therefore only a fraction of that recorded by the rain gauge.

The aridity of the Karoo region is increased by the very rapid evaporation which takes place. The skies are normally very clear, the insolation intense, dry winds are frequent, the atmospheric humidity is very low and the elevated altitude also favours rapid evaporation. The vegetation is always sparse and the ground is freely exposed to all these drying influences. Moreover, the water table in the soil is low and except in the stream-beds, is of little or no value to plants. The streams that flow into the Karoo from the bordering mountains are apparently less in volume than those on their seaward slopes, and they disappear rapidly after reaching the Karoo. The Karoo stream-beds are dry for the greater part of the year, with the exception of occasional pools.

In recent decades, moreover, the aridity of the Karoo has been markedly increased by overstocking and its attendant evils. Many areas are approaching a completely desert condition, bad veld management having rendered them less capable of resisting periods of abnormally severe droughts than formerly.

The rainfall of the Karoo, as of the Union generally, has two origins. In the winter the prevailing westerly winds bring moisture from the Atlantic Ocean and this is precipitated along the western and southern Cape ranges as rain, snow and hail. Deep barometric depressions with correspondingly strong winds may carry the rain further eastwards, and at such times falls may take place over the Western and Little Karoos. In the Western Karoo the quantity of winter rain diminishes as one goes eastward, becoming practically nil between Laingsburg and Prince Albert. In the summer the prevailing winds blow from the Indian Ocean, and the moisture from this source is precipitated in the form of direct rains and mountain mists in the southern coastal belt. Over the Karoo, however, as

over the Transvaal, Orange Free State and Natal, thunderstorms are of frequent occurence at this period, and local showers, often of great intensity, take place. The further westward one goes in the Karoo, the rarer become these summer storms, until in the Touws River and Matjesfontein district they cannot in any way be depended upon.

It is possible to draw a somewhat vague line across the Karoo, dividing districts with a preponderantly winter rainfall (on the south and west) from those with a preponderantly summer rainfall (on the north and east). Along this line, where the rainfall is most evenly distributed it is also most scanty, and districts such as the Koup (or Ghouph) are in some years practically rainless.

The prevailing types of vegetation to west and east of this zone of demarcation are markedly distinct, though they pass imperceptibly into one another. In the southern and western or winter-rainfall area, water storage is of the first importance in order to tide over the hot dry summer with its intense evaporation; while owing to the lack of surface moisture, such herbaceous plants as the Gramineae are unable to flourish in their natural growing season, the summer. Consequently we find in the west a vegetation largely composed of succulents and geophytes in which grasses are very scanty. In the northern and eastern or summer-rainfall area on the contrary, xerophilous grasses find more suitable conditions for growth, and succulents are less abundant and do not tend to dominate. The eastern Karoo is therefore practically a grassland. Small shrubs occur plentifully in the winter rainfall area, and somewhat less plentifully in the summer-rainfall area: their deep-rooting habits rendering them less directly sensitive to the season of the rainfall than are the surface-rooting grasses and succulents.

Within a radius of 200 miles of Cape Town, the Karoo areas are all of the winter-rainfall type, merging into the Koup area with occasional rains at any season. The following areas can be distinguished geographically:—

(1) The Robertson Karoo, occupying a small area in the Breede River Valley between Worcester and Swellendam.

(2) The Little Karoo, bounded by the Little and Great Zwartberg Ranges on the north and the Langeberg on the south.

(3) The Western Karoo, lying to the north of the Witteberg and the Little Zwartberg, and bounded on the north by the Komsberg; ending on the west in the Hex River Mountain massif, and passing gradually into the Koup and the Great Karoo on the east.

(4) The Doorn and Tanqua Karoo, the broad valley of the Doorn and Tanqua Rivers, between the Roggeveld escarpment and the Cederberg and Cold Bokkeveld ranges.

(5) The Roggeveld and Calvinia Karoo.

(6) The Van Rhynsdorp Karoo.

Botanically, the differences between these areas are rather floristic than ecological, the main vegetational features being somewhat uniform, though the actual specific composition of the floras varies considerably. Much more detailed work is necessary before accurate comparisons can be made. It will be best to study a single area as typical of the various " Karoos " and the Western Karoo may be selected for the purpose. To the general public it is the best known, as the main railway line from Cape Town to the interior passes through it from west to east. This route corresponds with the line of decreasing rainfall, and many of the correlated features are readily seen from the train.

The Western Karoo as seen from the Train.
(*Main Line, Cape Town to Transvaal.*)

The first glimpse of typical Karoo country is on the left about four miles beyond Worcester, the low hills of clay-shale soil near the entrance of the Hex River Poort being dominated by shrubby Mesembryeae together with *Crassula Cotyledon* and *C. perfossa*, *Cotyledon orbiculata* and *C. paniculata*, *Euphorbia mauretanica* and other typical Karoo shrubs such as the guarri (*Euclea undulata*) and species of Lycium. On the rocky ground between De Wet and Sandhills numerous succulent plants occur such as *Aloe parvispina*, *Cotyledon orbiculata*, *Crassula perfossa* and *C. Cotyledon*: but the vegetation of the quartzite rocks is rather of the Dry-Cape-with-Succulents type and not characteristically Karoo; the mass of the vegetation being composed of species of Rhus and Heeria, *Dodonaea thunbergiana*, *Cliffortia ruscifolia*, *Chrysocoma tenuifolia*, *Euryops tenuissimus*, *Mundia spinosa*, *Olea verrucosa*, Eriocephalus spp., Rhenoster bush and Elegia sp.

The sandy drifts in the broader portions of the Hex River valley are also occupied by a " Cape " flora, with large bushes of *Dodonaea thunbergiana*, *Cliffortia ruscifolia*, two species of Leucadendron, tall Elegias, *Euryops tenuissimus*, the handsome *Lebeckia cytisoides* and a tall blue Salvia. The proximity of Karoo conditions is indicated by the occurrence of *Cotyledon Wallichii*, bushy Mesembryeae, *Chrysocoma tenuifolia* and the kraalbos (*Galenia africana*).

In the neighbourhood of De Doorns on clay-silt soils Rhenoster bush is dominant and here appears the typical thorn-bush of the dry river beds, *Acacia Karoo*, from which the village no doubt takes its name.

PLATE II. The Cycad Amphitheatre at Kirstenbosch. *Photo: A. Elliott.*

The magnificent Hex River Mountains on the left, culminating in Matroosberg, and the Keeromsberg and Kwadouws Berg on the right bear a Cape flora of a xerophytic type.

On leaving De Doorns the gradient becomes steep and the long climb to the Western Karoo plateau begins. The rail winds upwards over hard shale hills of the Bokkeveld formation bearing a vegetation in which the succulent element has become prominent. The rainfall is about 12 inches, and large succulents are abundant. The most striking are the boterboom (*Cotyledon paniculata*) with grotesque stout trunks and succulent deciduous leaves; *Cotyledon Wallichii* somewhat similar but with cylindrical leaves and knobby stems (where these two grow together a hybrid may often be noticed); and the milk-bush *Euphorbia mauretanica* with tall sparsely-branched pale succulent stems. Clusters of enormous bulbs (*Urginea altissima*) with slender inflorescences up to six feet high are abundant. *Aloe microstigma* with reddish leaves forms conspicuous patches on northern slopes, and the beautiful *Aloe striata* may be seen just beyond Tunnel Siding. Shrubby plants are abundant, the guarri (*Euclea undulata*) being specially noticeable, and forming small pure local groves. Other small shrubs are mainly Compositae, species of Euryops, Relhania, Pteronia, and Eriocephalus being abundant. The succulent *Euphorbia hamata* grows at the entrance to the tunnel, and succulent and tuberous rooted Othonnas are frequent. *Hydnora africana* occurs as a parasite on *Euphorbia mauretanica*, and among bulbous plants the huge bulbs of *Buphane disticha* and the handsome *Veltheimia glauca* may be noticed. At the head of the pass the first flat-topped kopje, Tafelberg, marks the margin of the plateau, and the train circling round this at an altitude of 3,150 feet leaves the Cape mountain region and enters the Western Karoo proper.

The first few miles of the plateau consists of sandy and stony flats on which Rhenoster bush and *Chrysocoma tenuifolia* reign supreme, the association being poor in species and deficient in succulents: this poverty being characteristic of rhenoster veld wherever it occurs. At Touws River the rocky kopjes are mainly dominated by a typical karoo Mesembryanthemum association, except on their southern sides where a few Ericas, Leucadendrons, Lobostemons and other representatives of the Cape flora occur. The rainfall is about 10 inches and at this critical limit the difference in insolation on north and south sides of a kopje is sufficient to tilt the scale towards a karoo or a Cape vegetation respectively.

Beyond Touws River the plains derived from the Witteberg quartzites are covered with reddish sand with scattered stones. The vegetation is generally less than a foot in height consisting mainly of species of Eriocephalus and Pteronia, with thorny bushes of *Asparagus stipulaceus* and *Lycium roridum*. Large succulents are absent except for groups of *Cotyledon Wallichii* on rocky hillocks, and Mesembryeae are scarce except for Psilocaulons.

The line enters the Dwyka beds about six miles beyond Touws River, and a richer Karoo vegetation appears, consisting of more numerous species of shrubs and succulents.

The sharp difference between the vegetation of plains and kopjes can be well seen at many points. Three miles beyond Jandeboers, for instance, is a rocky ridge of Dwyka conglomerate on the north aspect of which occurs a fine growth of succulents, of which *Euphorbia mauretanica*, *Cotyledon Wallichii*, *Aloe microstigma* and *Crassula perfossa* are conspicuous, the last two giving the slopes a characteristic reddish tint. These large succulents are absent from the plains which have a mainly shrubby vegetation of Eriocephalus, *Galenia africana*, *Chrysocoma tenuifolia*, Pteronias, Selagos and Rhenoster bush.

In the neighbourhood of Constable, however, Witteberg quartzites are again entered and these continue to the railway summit near Pietermeintjes. On the bold rocky outcrops of these beds a dry Cape vegetation occurs, a good example of it being seen on the southern side of the line a mile beyond Constable. *Protea marginata* is the most conspicuous shrub, growing to a height of six or eight feet, and other Proteas, Leucadendrons, Restionaceae, Ericaceae, Rutaceae, Lobostemons, etc. occur. In this area, with the critical rainfall of about 12 inches the Karoo rocks bear a "Karoo" flora and the Witteberg sandstones and deep drift sand (as at Tweedside) bear a "Cape" flora.

Near Pietermeintjes the last is seen of the "Cape" flora along this route; the line enters the Karoo geological formation and the vegetation visible from the train is entirely of the Karoo type.

The average rainfall from the margin of the Karoo plateau at Matroosberg station to Pietermeintjes varies from 10 to 14 inches, though frequently much below these figures. Beyond Pietermeintjes, however, with falling altitude and increasing distance from the mountain barriers, the rainfall decreases rapidly and more or less evenly, until at Laingsburg the annual average is only about 4 inches. The aspect of the vegetation reflects this increasing aridity, and from Laingsburg to Prince Albert Road the plants are for the most part depressed Mesembryeae sparsely scattered over the shaly soil, with wide inter-spaces which, however, become more or less clothed with annuals after a good rain.

The Whitehill and Matjesfontein Area.

As an example of Karoo vegetation on a smaller scale the area in the neighbourhood of Whitehill and Matjesfontein may be taken. This lies at an altitude of approximately 3,000 feet. The rocks are mainly Dwyka shales and conglomerate with large lenticular quartzite inclusions. On the south, three miles from the railway, lies the Witteberg range 5,000 ft. high, composed of the quartzite rocks to which the range gives its name. On the north are the Ecca beds, a prominent outlier of which is Ngaap Kop (so called from the "Ngaap" or Trichocaulon spp. formerely abundant on its slopes) opposite Whitehill: on the lower slopes of this hill can be seen the "white band" of gypsum shale, marking the border-line of the Ecca and Dwyka formations. The Dwyka conglomerate weathers into a greyish or reddish soil, usually very shallow. Rocky outcrops are frequent, these having the characteristic "pillow" or "tombstone" appearance. Some parts of the area possess a deeper fine reddish soil with comparatively few stones. Other parts, derived from large quartzite inclusions, weather to a coarser sandy soil thickly strewn with stones. The Baviaans River flows in a shallow bed in its own alluvium, which is a fine yellowish silt several feet deep. The river itself only contains water for a short time after rains, except in a few pools. Several streams rising in the Witteberg, discharge storm water into the Baviaans River.

The different types of soil bear different plant associations, made up of different species, and such factors as aspect have also a conspicuous effect on the vegetation. The impression given by the vegetation at first is one of monotony, but this yields to a closer study. In reality the flora is a rich one, and there is present a great variety of shrubby plants, succulents, bulbous and tuberous plants, annuals, grasses and even ferns. The tendency to uniformity in the aspect of the shrubs, on which the physiognomy of the vegetation largely depends, is due to the heavy grazing to which the area is subjected. This factor, combined with the trampling of the soil between the bushes and root competition tend to the characteristic "hottentot's head" appearance of the country.

The Raunkiaer Percentage Spectrum of the flora of the Karoo at Whitehill, based on 275 species of flowering plants collected there, is as follows:—

S	E	MM	M	N	Ch	H	G	HH	Th	
29	0	1	1	34	2	7	15	0	11	= 100

Compared with the "normal spectrum" one notes the very high percentage of succulents, small woody plants and geophytes, that is of the "xerophilous" elements: the luxuriant and herbaceous types, namely large woody plants, chamaephytes and hemicryptophytes, being markedly deficient.

River Bed Vegetation.

The river runs for a few days only after heavy rains in its catchment area. Small semi-stagnant pools may remain for a considerable period, however, and these support an algal vegetation, while their muddy margins are occupied by a dense mat of such plants as *Juncellus laevigatus* and *Cotula coronopifolia*. The stream cuts its way through deep fine-grained alluvium, and at the foot of the banks grow tufts of *Scirpus dioicus*, associated with *Mentha longifolia*, *Lobelia thermalis*, etc. At the crests of the banks occurs a well-marked zone of the soft-wooded shrub *Melianthus comosus*. Ground water is present in the river bed alluvium long after the river is dry, as borings show, and this enables tree growth to take place. The level surface of the alluvium is occupied by a fairly dense growth of trees 15-25 feet in height, the most important being *Rhus lancea* (Kareeboom), *Acacia Karoo* and *Royena pallens*. On the branches of these occur species of Loranthus and Viscum as parasites. The destruction of trees for fencing posts and firewood has led to the denudation of this stream-bed woodland, and its place is taken by a shrubby growth in which *Salsola aphylla* (Ganna) and *Lycium tetrandrum* are dominant, while species of Psilocaulon and some trailing and annual Mesembryeae also occur abundantly. This vegetation is of a distinctly halophytic character, the alluvial soil being strongly brak. An analysis of the water obtained from a shallow well in the alluvium gave the following figures (Professor Tietz):—

Residue on evaporation	185	parts per 100,000
Residue on ignition	155	,,
Alkalinity as $CaCO_3$	25	,,
Calcium as CaO	11	,,
Magnesium as MgO	16	,,
Sulphate as SO_4	12	,,
Chloride as Cl	60	,,
Iron	nil	

Stream-side Vegetation.

Where temporary streams cut through the rocky ground at a steeper angle, alluvial deposits are very scanty, and river-bed woodland does not occur. The course of the stream, however, is marked by certain characteristic plants especially *Royena hirsuta*. The guarri, *Euclea undulata*, is also more abundant along streams, though scattered over dry hillsides also. Other characteristic plants are the spiny

and almost leafless *Lebeckia pungens*, the vigorous climbing *Asparagus aethiopicus*, and *Galium tomentosum*.

Dry Karoo Associations.

Three floristically distinct associations can be recognised in the Whitehill area, depending on the nature of the soil.

(a) *Association of deeper soils.* This is dominated by *Mesembryanthemum spinosum*, about a foot in height without spaces between the bushes, and to the exclusion of practically all other plants.

(b) *Association of rocky areas.* The greater part of the district lies on the hard blue Dwyka conglomerate, which occurs in a slightly fissured condition at the surface, with a very scanty or no covering of soil. The plant association is naturally an open one. The shrubby plants insert their roots along the steeply sloping rock fissures and penetrate to a fair depth: of these a large number of species occur of which the most important are the Compositae *Chrysocoma tenuifolia*, *Pentzia virgata*, *Eriocephalus glaber*, *E. eximius*, *Pteronia pallens*, *P. Foleyi*, *Hirpicium echinulatum*, *Felicia muricata*, and also members of other families such as *Zygophyllum maculatum*, *Hermannia pallens* and other species, *Galenia fruticosa*, two or three species of Tetragonia and very many others which may be locally abundant.

Succulent plants are plentiful in this type of association. Some of them are of the much branched shrubby type and really belong to the shrub layer: of these the most noteworthy are *Mesembryanthemum spinosum* and several other Mesembryeae such as species of Aridaria, *Ruschia stellata*, *R. karooica*, and *R. crassa*; *Euphorbia Mundii*, *Crassula subaphylla*, *C. divaricata*, *C. Loganiana*, *Sarcocaulon Patersonii*. Other succulents are robust plants such as *Cotyledon orbiculata*, *C. reticulata*, and *C. Wallichii*, while rocky outcrops bear such striking succulents as *Euphorbia heptagona* and *Aloe parvispina*, as well as *Sarcocaulon Burmannii*, the curious *Anacampseros papyracea* and species of Conophytum wedged in the smaller crevices. A large number of other succulent plants occur, many of them usually close under the bushes, others tending to clothe the ground between. *Cheiridopsis cigarettifera* is an abundant mat-forming plant, and *Cephalophyllum curtophyllum* is a common trailer. The northward-pointing *Cylindrophyllum calamiforme* occurs in local societies. Two small Aloes, viz., *A. variegata* and *A. longistyla* and a Gasteria, *G. Zeyheri* occur sparingly, while *Haworthia margaritifera* is locally plentiful. A large number of Stapelieae occur, *Stapelia Pillansii* being the most frequent and conspicuous: other species, present in smaller quantities and usually hidden at the base of shrubs, are *Stapelia rufa*, *Piaranthus comptus*, *Huernia Pillansii*, *H. clavigera*, *Pectinaria asperiflora*, and some others. Remarkable small species of Crassula occur frequently, especially *C. Archeri* and *C. columnaris* on open ground and *C. orbicularis* under bushes. In the shelter of shrubs also are found *Haworthia arachnoides*, three-quarters buried in the soil, the trailing *Kleinia radicans* and the very similar *Senecio abbreviatus*, *Anacampseros telephiastrum* and *A. filamentosa*. This list of species could be considerably lengthened, the association on Dwyka conglomerate being exceedingly rich in succulent plants.

Geophytes are also very well represented, and include several species of Albuca and Urginea, the striking "stemless" *Massonia obovata*, *Androcymbium cuspidatum*, *A. Burchellii*, *Lapeyrousia fistulosa* and *Polyxena pygmaea*, small species of Lachenalia, Ixia, Syringodea, Brunsvigia, Rhadamanthus, Eriospermum and Schizobasis, and many other petaloid Monocotyledons. Dicotyledons include several species of Oxalis, *Crassula Saxifraga*, *Pelargonium moniliforme*, the remarkable tuberous *Aridaria resurgens*, the twining *Cyphia volubilis* and the following with very large perennating tubers, *Pachypodium bispinosum*, *Fockea Comaru*, *Kedrostis punctulata*.

Of "herbaceous" plants in the ordinary sense, very few are found in this association. *Dianthus micropetalus*, *Hermannia nana*, *Aptosimum indivisum*, and a few grasses e.g. *Aristida vestita*, *Eragrostis curvula*, *Danthonia purpurea*, *Ehrharta calycina*, *Fingerhuthia africana*, are almost the only perennials: the absence of summer rains being unfavourable to this class of plants. Annuals are, however, abundant and in a good season cover the bare spaces between the shrubs, their flowers occasionally making a bright display of colour. Among them are *Zaluzianskya inflata* and other species, *Nemesia anisocarpa*, *Felicia adfinis*, *Amellus strigosus*, *A. microglossus*, *Leyssera tenella*, *Cenia microglossa*, *Matricaria dichotoma*, *Ursinia annua*, *Ifloga polycnemoides* and the grass *Danthonia tenella*.

Finally, on the bare rock surface occur several species of lichen and the mat-forming moss *Grimmia pulvinata*.

The above account applies to level or gently inclined ground, but on steep slopes considerable differences are noticeable: this being due partly to different degrees of insolation, and the occurrence of deeper rock-crevices and soil pockets. On *north* slopes in the Dwyka conglomerate it is frequent to find a dense covering of large spreading bushes of *Crassula perfossa*, and colonies of *Aloe microstigma* and *Euphorbia mauretanica*, together with *Pteronia Foleyi* and some other shrubs. *South* slopes on the con-

trary have a much reduced insolation, and the shadier and moister conditions which prevail allow of the growth of a very distinct association of plants. Here we find shade-loving Crassulas such as *C. barbata*, *C. Weissii* and *C. scalaris*, tuberous and other Pelargoniums such as *P. ovatostipulatum*, ferns such as *Pellaea andromedaefolia*, characteristic Mesembryanthemums such as *M. pygmaeum*, *Stachys rugosa*, Brunsvigias, *Cotyledon Phillipsiae*.

(c) *Association on quartzites.* In the Whitehill and Matjesfontein district several areas occur in which the soil is derived from quartzite inclusions in the conglomerate. These areas may be of considerable extent and are usually strewn thickly with rounded or angular fragments of light coloured rock, the scanty soil being of a more sandy nature than that on the conglomerate proper. These areas possess a special vegetation of their own which is sparser than on the conglomerate, but tends to grow taller. *Pteronia flexicaulis* is characteristic, and so are certain species of Crassula, e.g. *C. pyramidalis*, *C. pachyphylla*, and *C. Purcellii*. *Pelargonium alternans* and *P. ferulaceum* are typical thick-stemmed shrubs, and such plants as *Kleinia acaulis*, *Crassula canescens*, *Caralluma ramosa* and the large *Crassula Cotyledon* also occur.

In a few spots the ground may be strewn with smaller fragments of white quartz, and here we may find such small grey Helichrysums as *H. laneum*, *H. silicicolum* and *H. Archeri*, as well as an abundance of the white *Anacampseros papyracea*.

Other Associations.

The Ecca beds of Ngaap Kop bear a Karoo vegetation which differs in some respects from that of the Dwyka, especially on the northern aspect, where the usual *Aloe microstigma - Crassula perfossa* association is replaced by an open vegetation including *Asparagus striatus*, Trichocaulon sp., *Caralluma ramosa*, *Buphane disticha*, Euphorbia spp., and a number of shrubby plants.

The white gypsum band between the Ecca and Dwyka beds is almost sterile, except for half-buried mats of the remarkable *Gibbaeum perviride*, which is practically confined to this soil.

Transition to Cape Vegetation.

On the southern side of the Whitehill-Matjesfontein Karoo area, at a distance of about three miles from the railway the Witteberg quartzites crop out in a folded range of mountains rising to 5,000 ft. altitude. These mountains provide a distinct habitat for plants for several reasons. Their greater altitude brings about a somewhat higher rainfall, and their crest is frequently shrouded in the south-easterly cloud during the summer. The soils derived from the sandstone rock are poorer in soluble plant food than the relatively rich soils from the Dwyka conglomerate, and their consistency is lighter and more porous. Moreover, the rock fissures are deeper and larger shrubs can exist than is generally the case on the Karoo. These various factors, combined no doubt with others more subtle, result in the development of a Cape vegetation on the Witteberg range. The effect of the climatic factors is clearly shown by the fact that on the southern slopes of the mountains this Cape vegetation occurs down to as low as 3,300 ft., while on the northern side it is very scantily developed below about 4,500 ft.

This Cape vegetation is rich in species, totally distinct from that of the adjoining karoo: in fact, no single species is common to the two formations. Details cannot be given here; suffice it to say that on the Witteberg occur at least 16 species of Proteaceae, 22 species of Ericaceae, 15 species of Restionaceae, 7 species of Rutaceae, and a large number of other typical Cape plants. The contrast between Cape and Karoo vegetation is most striking, both floristically and ecologically.

At the foot of the Witteberg there occurs a transitional zone between the Cape and Karoo areas, this having certain features of its own, and differing from the formations on either side. The quartzite rocks bear a flora dominated by twiggy freely-branching shrubs, for the most part inedible to stock and therefore less distorted in shape than the Karoo shrubs. Examples are *Phylica lasiocarpa*, *Passerina glomerata* and several species of Pteronia, Relhania, Elytropappus and other Compositae. Succulent plants are scarce in this association, which thus differs from typical Karoo. On the other hand there are no Proteaceae, Ericaceae and Restionaceae.

It is remarkable how distinct this transitional association is from the association on included Karoo quartzites on the one hand, and from the Cape association on the other. As one ascends the slopes of the mountain from the transitional zone one suddenly reaches outlying shrubs of *Protea marginata* and simultaneously one notes the occurrence of two or three species of Restionaceae and one or two Ericaceae (minor genera). The change is all the more striking because there is no obvious correlated change in the character of the environment.

This transitional zone with its numerous Compositae and poverty in succulents is found over a very wide extent of country in the Western Cape; and one almost invariably traverses it, as a broad or narrow zone according to cir-

cumstances, in passing between a Cape and a Karoo type of vegetation.

The Little Karoo.

The western portion of the Little Karoo, sometimes known as the Ladismith Karoo, lies mainly on Bokkeveld shales and quartzites. The altitude is somewhat less than the Western Karoo, Ladismith being 1,860 feet and the southern margin of the Little Karoo about 1,000 ft. The average annual rainfall is 10-15 inches, most of which falls in winter. The soil is on the whole more sterile than that of the Western Karoo, and the vegetation scantier.

A well-marked transitional zone lies along the southern margin of the Little Karoo, passing into the Cape vegetation on the sandstone of the Langebergen on the southern side and into the true Karoo vegetation on the northern. The Montagu-Barrydale road passes mainly through this belt, which, as elsewhere, is characterised by abundant shrubby Compositae and few succulents.

The flora of the Little Karoo is strikingly different from that of the Western Karoo. This is particularly true of the succulents. The whole district is exceedingly rich in Mesembryeae, including some of the most highly modified types. The genus Gibbaeum is especially well represented, and other striking plants are *Muiria Hortenseae*, *Argeta petrensis*, *Rimaria Heathii* and species of Glottiphyllum and Conophytum. A striking feature of the area is the occurrence of tracts covered uniformly with white quartz fragments: the subsoil being a close clay. It is on this type of ground that the most remarkable succulents grow. These "white patches" frequently bear very light-coloured, grey or white plants (glaucous or pubescent). Horizontal ones may be covered with a uniform growth of *Gibbaeum pubescens*. Gentle slopes have the half-buried and almost invisible G. *molle* and G. *pilosulum*, or in some cases, the white G. *album*, and the grey *Muiria Hortenseae* and *Argeta petrensis*. Shrubs are scarce or absent on these white patches, perhaps owing to imperfect subsoil aeration. The succulents above-mentioned are entirely confined to the white patches: but the converse is not true, for many white patches exist without them.

On the north side of the Little Karoo the steep and picturesque hills have a vegetation which includes certain outliers from the country further east. The most striking of these is the tree succulent *Portulacaria afra*, and others are *Aitonia capensis*, *Carissa Arduina*, *Aloe speciosa*, Testudinaria sp., and certain Acanthaceae. Northern and southern aspects on these kopjes show striking diifferences in vegetation, the rainfall being about the critical limit of 14 inches.

The Doorn and Tanqua Karoo.

Great stretches of this are covered with plant associations dominated by *Mesembryanthemum spinosum* and *Pteronia pallens*, these occupying the prevailing sandy ground derived from the sterile Witteberg sandstone. Large areas of fine brak river-silt occur, dominated by an open growth of *Salsola aphylla*, with which are associated other Chenopodiaceae, viz. *Atriplex Halimus*, *A. albicans*, and Suaeda sp., with Lycium sp., *Melianthus comosus* and some others. On stony ground occur such curious succulents as *Didymaotus lapidiformis* and *Punctillaria Roodiae*, with other Mesembryeae.

The Roggeveld and Calvinia Karoo.

In the Nieuwoudtville district, with a winter rainfall of about 12 inches and a fairly uniform altitude of about 2,500 ft., the different rock formations determine the types of vegetation with considerable precision. On the "red ground," derived from diorite outcrops, an Eriocephalus sp. is dominant and there are large numbers of bulbous, herbaceous and annual plants, e.g. species of Bulbine, Sparaxis, Ixia, Massonia, Gethyllis, Arctotis, Nemesia, Diascia, Ursinia, Berkheya, Venidium, etc. The sandy soils derived from the Table Mountain Sandstone, forming the Bokkeveld Mountain escarpment, have a true Cape flora, with at least four species of Protea, three of Leucadendron, three Ericaceae, and species of Nivenia, Leucospermum, Restio, Cannamois, Thamnochortus, Phylica, Diosma, etc., with a few bulbous plants and many annuals: while on the rocky outcrops are Aloes, Cotyledons, Crassulas, etc. The third type of soil is derived from the Karoo rocks of Dwyka age, and this bears a typical Karoo plant formation dominated by Mesembryeae, of which *M. spinosum* is the most abundant. Almost the whole flora is succulent, consisting of Mesembryeae of shrubby and trailing types, with *Aloe Krapohliana*, Carallumas, Euphorbias, *Cotyledon Wallichii*, *Euphorbia mauretanica* and *Galenia africana*: annuals, bulbous and herbaceous plants are relatively scarce.

This district provides a clear demonstration of the way in which, at the critical limit of rainfall, soil factors may determine whether a Karoo vegetation or some other plant formation shall occur. The precise nature of these soil factors, however, still awaits investigation.

The Van Rhynsdorp Karoo.

The lesser altitude (about 1,000 ft.), lower rainfall (about 5 inches), and high temperatures in this district

produce a Karoo formation of a very arid type on the Ibiqua beds. Mesembryeae are dominant in a very open formation, including shrubby Psilocaulons, deciduous Schwantesias, Conophytums, *Argyroderma testiculare*, *Roodia digitifolia*, etc., and also *Aloe falcata*, *Euphorbia fasciculata* and other striking succulents. This association passes gradually into that of the Hardeveld and Barren Karoo in which vegetation is even more restricted.

The Robertson Karoo.

The rainfall is about 12 inches, and on the Bokkeveld, Ecca and Dwyka beds a Karoo formation is developed, with such conspicuous plants as *Cotyledon paniculata*, *C. Wallichii*, *Euphorbia mauretanica* and *Urginea altissima* abundant, associated with many Mesembryeae and Stapelieae, Gasterias and Apicras, and such striking bulbous plants as Massonias and *Bulbine mesembryanthemoides*, etc.

Some Characteristics of Karoo Vegetation.

Root Systems.

The shrubby species are typically deep-rooting: the succulent species (with rare exceptions, e.g. Euphorbia spp.) have a spreading root system just below the surface. Thus the succulents are able to take advantage of occasional dews and light rains, which do not affect the shrubs. A comparatively light shower, after a long period of drought, will swell the succulents to turgidity but will not affect the woody plants: these latter requiring a more abundant rain to start growth. On the other hand, the shrubs have extraordinary powers of drought resistance, despite the general absence of such "xerophilous adaptations" as hairiness, resting buds, etc.; and this is probably due in part to their deep root systems.

Position of Succulents.

The small succulents are very commonly found growing at the base of shrubs. This is probably due to various causes, of which the chief is the slightly greater moisture of such situations. This enables germination to take place and the seedlings to become established: and then, since the surface-rooting succulent scarcely competes with the deep-rooting shrub, the two are able to grow in close association. Another factor is that, under the shelter of hard woody or thorny bushes the succulents are more immune from the trampling and browsing of herbivorous animals.

In many cases small succulents are found in the partial shelter of rocks and stones, these acting in much the same way as shrubs: moreover the effect of a stone lying on the soil is to mitigate the intense heating effect of the sun upon the soil which appears in some cases to have an adverse effect on the shallow root system of the succulent.

Many succulents, however, habitually live in complete exposure, e.g. *Crassula columnaris*, *C. pyramidalis* and other species. Others not only live in full sun, but normally inhabit bare rock outcrops, in the crevices of which they insert their roots: such are many species of Conophytum, *Anacampseros papyracea*, *Sarcocaulon Burmannii*, etc.

Other Features of Succulents.

With the exception of the Aloineae (Aloe, Gasteria, Apicra and Haworthia) and some Euphorbias the Karoo succulents are deficient in mechanical tissue and have relatively thin cuticles: very few of them have a dense hairy covering (e.g. *Kleinia Haworthii*), and the slight pubescence of some can hardly be a xerophilous feature (e.g. *Gibbaeum pilosulum*, *Muiria Hortenseae*). There is seldom any well-defined aqueous tissue, but the whole plant is filled with a pulpy parenchyma which is rich in mucilage and which retains moisture strongly.

Bulbous plants.

These are very numerous and range from the enormous bulbs of Buphane and Brunsvigia to the small corms of Ixia, Syringodea, etc. Many of the bulbs have a very soft mucilaginous texture, and apparently serve as reservoirs of water as well as of food materials. The leaves are frequently slender and spirally twisted, e.g. in several species of Albuca, Gethyllis, Bulbine, etc. In a few instances the leaves may be succulent as in *Bulbine mesembryanthemoides* and *B. succulenta*, in others there may be a clothing of hairs, e.g. Gethyllis spp., but usually they are of no specially xerophilous appearance. The bulb tunics are often very numerous and persistent, fibrous or indurated. In specially dry seasons the bulbs may entirely fail to grow, and in the majority of cases even a heavy summer rain has no effect upon them: but a good rain in May or June stimulates them to prompt growth. The majority of them are spring-flowering; but a few (especially the Amaryllidaceae) flower in the late summer in the leafless condition, and the seeds which often have no resting period are ready by the time the winter rains begin.

Plants with Perennial Tubers.

Some of these have perennial shoots above ground (e.g. *Pachypodium bispinosum*) but the majority have annual shoots which appear at the beginning of winter (e.g. *Fockea Comaru*, *Kedrostis punctulata*, Cyphia spp.). Such plants are frequently twiners and the climbing species of

Asparagus and Testudinaria are other examples of a similar tendency. The Eriospermum spp. which have potato-like tubers flower and leaf at different seasons. Certain Cotyledons have subterranean tubers in addition to succulent deciduous leaves.

Rhizomatous and stoloniferous plants are very rare in the Karoo formation. *Aloe variegata* and *Euphorbia stolonifera*, however, propagate by underground runners. The Gramineae are all of the tufted type, and there are no Cyperaceae, Juncaceae or Restionaceae in dry ground.

Annual Plants.

These appear in myriads after a good rain in May or June. Rains during the summer, however, cause practically no germination, just as in the case of the bulbs. In drought years annuals are very scarce, the seeds being able to lie dormant for several years awaiting a sufficient rain. If the rain be sufficient to start germination the seedlings appear in a very few days and quickly produce two or three leaves and a flower or two: if further rains occur growth proceeds, but if not the plantlet sets a few seeds and dies, its whole life only extending over a few weeks.

The annuals are plants with little or no xerophilous character: they grow only in the winter when atmospheric humidity is relatively high and evaporation and insolation are at a minimum. They are opportunist ephemerals of an extreme type: and it is a very rare occurrence for annuals to be able to flourish to such an extent as to carpet the Karoo with flowers.

Karoo Shrubs.

These are mostly of low stature, but this is accentuated by the severe grazing to which they are subjected. The majority of them have small slender leaves borne in considerable numbers: one of the rare exceptions is the broad-leaved guarri, *Euclea undulata*. Latex is infrequent, but resinous, waxy and aromatic secretions are almost universal, species of Euryops, Pteronia, Chrysocoma, Tripteris, etc., being conspicuous in this respect: and doubtless this is one of the chief factors in their xerophily. Most of them "break" freely (in the gardening phrase) after being eaten back. Very few are deciduous. Spinescence is not frequent, exceptions being shrubby species of Asparagus and Lycium. Apart from an occasional Helichrysum very few of the shrubs are markedly hairy.

Protection against Grazing.

The game animals of yesterday and the goats and donkeys of to-day are a powerful ecological factor, and resistance to grazing is a condition of survival. This is accomplished in various ways.

(a) *Unpalatability and Toxicity.* Many plants are only grazed under conditions of extreme scarcity, and some not at all. Examples of unpalatability are *Galenia africana* and *Chrysocoma tenuifolia* which tend to increase in overstocked areas: also many species of Aloe, Pteronia, and Mesembryanthemum. Definite toxicity is well-known in *Cotyledon Wallichii* and *Pteronia pallens* and these are avoided by Karoo animals, though they may be eaten (with ill results) by stock freshly brought to the district. Latex, resins, aromatic and bitter substances are doubtless checks to grazing: but animals constantly nibble young shoots of certain copiously laticiferous plants such as *Euphorbia mauretanica*, and the aromatic Pentzia spp. are one of the chief stock foods.

(b) *Powers of Regeneration.* The edible plants are eaten back to the old wood by goats and donkeys, but survive through their powers of regeneration. Examples of this are Pentzia spp., Tetragonia spp., *Phaeoptilum spinosum*, Hermannia spp., etc. Under modern conditions of overstocking, however, these plants get little opportunity of regenerating by seed and are gradually being supplanted by species valueless to stock.

(c) *Spinescence.* This appears to be rather a physiological reaction than a protective adaptation. It may, however, act as a deterrent to grazing as in Asparagus, Lycium, Apicra and Euphorbia spp.

(d) *Inconspicuousness.* Many of the Mesembryeae closely resemble the stones among which they grow, e.g. *Pleiospilos Bolusii*, *Didymaotus lapidiformis*. Others are normally buried in the soil and only expose their leaf-tips e.g. Lithops spp., *Gibbaeum molle*, and during the dry season these may disappear entirely below ground. It is probable, however, that inconspicuousness is over-rated as a protective adaptation: the keen eyes of hungry animals could hardly miss many of these "mimicry" plants, and moreover when they are in flower they are often extremely conspicuous even to human eyes. The occurrence of white plants on white quartz-strewn ground is often quoted as a mode of concealment: but the most typical of these, *Gibbaeum pubescens*, makes a conspicuous display of magenta flowers. Such a typically white plant as *Anacampseros papyracea* is found as often on dark-coloured rocks as it is on the "white patches": though in this instance the adaptationists claim that it mimics the excreta of birds, which are naturally not confined to white ground!

R. H. COMPTON.

Haworthia.

CULTIVATED plants, as do many other things in civilized society, owe their existence to the prevailing fashions. Just now succulents are all the vogue—long may the fashion last.

Probably the first *Haworthia* ever grown in Europe was the one sent by van der Stel in 1701, which later was called *Haworthia recurva*, Haw. Since this early start the number of species in cultivation has steadily risen, for in 1812 Haworth enumerated 24 species, and when we come to Salm-Dyck's work in 1836 — 63 no less than 56 figures are reproduced representing about 39 species, all drawn from living plants grown in Europe. These would no doubt represent the collections of Thunberg, Masson, Bowie, and probably Zeyher, made between 1772 — 1850, nearly all unlocalised. Following closely on these are T. Cooper, H. Bolus, Mac Owan, and others whose collections, some with their precise localities, are included in the Flora Capensis (1896) where 64 species are enumerated.

During the present century, the interest in this group has continued to grow, and although in Berger's monograph (1908) we find the estimate reduced to 61, there is every prospect of the number being considerably increased, when workers at present engaged on the group have published their results.

Up to date about eleven new species have been published — *H. subspicata*, Baker, *H. Chalwinii*, Marl. and Berger, *H. Pearsonii*, Wright, *H. granulata*, Marl., *H. limifolia*, Marl. (see Plate, fig. L) *H. truncata*, Schönl. (fig. C). with its unusual distichous habit, *H. albanensis* Schönl, *H. Engleri*, Dinter, *H. Schmidtiana* and *H. Herrei* Poelnitz, and *H. variegata*, L. Bolus (fig.K).

In recent South African publications seven species are figured in colour, namely *H. arachnoides*, *Bolusii*, *tesselata*, and *viscosa* in South African Flowering Plants, and *Chalwinii*, *cymbiformis*, *fasciata*, *tesselata*, and *viscosa* in Marloth's Flora of South Africa (Plate 22).

To the uninitiated it comes as rather a shock to be told that *Haworthia* is a genus of the Liliaceae, and indeed it is a far cry from the stately Lilies of St. Joseph and of the Madonna, the glowing Tiger Lilies, Tulips and other splendid ornaments of our garden. Even when we "consider the lilies" of our own country, *Gloriosa*, *Ornithogalum*, *Lachenalia*, *Agapanthus* and *Massonia* there is a big leap to *Haworthia*, unless we go by way of certain species of *Bulbine*, such as *B. mesembryanthemoides* whose non-bulbous root-stock and "window" leaves remind one of some of the species of *Haworthia*, even though the wide open saucer-like flowers, with their sleep movements are markedly different from the long tubed *Haworthia* flower.

It is only when we come to the long-shaped flowers of *Aloe*, *Gasteria* and *Apicra* that we find the nearest allies of *Haworthia*. Indeed in Salm-Dyck's time all these genera were again classified under *Aloe* just as they were before Duval raised *Haworthia* to generic rank. He separated it from *Aloe* by its bilabiate perianth which encloses the stamens. In *Aloe* the anthers are usually to be seen and the stamens are declinate, whereas in *Haworthia* they are regularly placed. In *Aloe* too a peculiar retraction occurs in the filaments of the protandrous stamens, after they have performed their work, a phenomenon which is not seen in *Haworthia*. Most nearly allied to *Haworthia* is the small genus *Apicra*, where the symmetry is entirely radial both in the androecium and the perianth.

Many *Haworthias* look like miniature *Aloes*, for both contain some of the characteristic xerophytic forms so typical of the arid parts of South Africa, notably those in which there is no great underground storage, and where most interesting and varied adaptations are found in the shoot, and especially in the leaves.

In all species the leaves closely overlap, and the stem is usually abbreviated, for the number of species with an elongated stem is comparatively few. In no case is there evidence of much storage in the stem. Sometimes all the leaves are well above ground as in figs. D. and E. and in others we find them buried in varying degrees, until in *truncata* (fig. C), only the apex appears above ground. In all these instances a "window" is necessary to let in light to the tissues below. These windows are often beautiful with their delicate veinings of green over the pellucid area. Some of the margins develop long eyelashes (fig. G) which must help to veil the light and serve as a protection. Many of these windowed forms have blunt tops (fig. B). In the tough-leaved forms the cuticle is thick and the attenuated points are directed upwards so that the hottest sun strikes the smallest area, their backs (rarely their inner surface as well) are studded

with pearl-like tubercles, which separate (fig. I) or run into lines (fig. D); more rarely one meets with definite file-like ridges (fig. L) or mottling as in *H. variegata* (fig. K).

As a typical species of *Haworthia* we have chosen Haworth's "cushion," *H. retusa*. The leaves are solid and unusually thick in the genus, the retuse surface forming the window. The greater part of the plant is buried in the ground looking like a truncated rosette, until the inflorescence appears from the central part. This is first seen as a mass of overlapping bracts which are slowly borne upwards as the peduncle elongates. The outer bracts are barren and take their place as scale-leaves on the lower part of the peduncle, the fertile keeping close together until the flowers actually develop when the intervals lengthen. As many as 22 may be borne in an inflorescence; 5-6 open at a time. In some species of *Haworthia* the inflorescence is branched, and in most the flowers are sessile or very shortly pedicelled.

The flower is characteristically bilabiate, the six perianth segments remaining in contact for some distance, after which the three upper lobes diverge from the three lower, the bilabiate appearance being increased by the latter curling outwards more than the former. The perianth-segments themselves are more or less alike, of a rather thick texture, white or pale greyish pink, with a dark stripe of green or reddish brown down the centre of each. No definite nectary is visible but honey is stored at the base of the perianth tube. The six stamens are hypogynous, three being longer than the rest. They ripen at a very early stage dehiscing their pollen by longitudinal slits, and are never longer than the so-called tube, more often being shorter. The stigmas are always very inconspicuous, the style in some cases bent slightly to one side, while in the forms where it is erect the stigma has an oblique apex. This appears to be a device to prevent self-pollination, especially when coupled with the fact that comparatively few flowers in an inflorescence set seed. The flowers are inodorous and not conspicuous, but the nectar is copious and the markings on the perianth are "honey-guides." The pollinating agents appear to be lepidopterous insects.

The fruits of *Haworthia*, like most of the Liliaceae, are capsules, there being two main types, the long type (fig. J) which seems to be characteristic of the windowed species, the short three angled fruit (fig. F) characteristic of the hard tubercled forms. The dehiscence of the capsule in both cases is loculicidal, the dispersal mainly by wind, the seeds being provided with a wing for that purpose.

No apparent movements in the floral parts have been observed, the flower once open remaining so, and always erect even in the fruiting stage.

It is interesting to note that in some of the buried and partially buried forms, some of the roots become thickened and later diminish in length by shrinking, thus playing the part of retractile roots such as are fund in *Oxalis*, *Gladiolus* etc., and serving to keep the plant deep in the soil.

Except for a single species in Angola, *Haworthia* is entirely confined to South Africa, and as far as we know at present to extra-tropical South Africa. None of the species are of any economic value beyond the fact that they are great favourites in rock-gardens and hot-houses as ornamental plants. Some 30 species have been identified in the living collection in the National Botanical Gardens, Kirstenbosch, besides one or two new species. These, together with 36 named species in the Bolus Herbarium, furnish us with some valuable additional information regarding the geographical distribution of *Haworthia*, which owing to the lack of records (e.g. in the Flora Capensis of the 64 species enumerated only 12 are localised) is inadequately given in all accounts of the genus hitherto published.

With these data before us it would appear that *Haworthia* has its headquarters in the Little Karroo and the South-Eastern districts of the Cape Province, extending as far North as King Williams Town. From this area about 32 species are recorded as follows:— from the Little Karroo including the divisions of Worcester, Swellendam, Riversdale and Oudtshoorn, 19 species (*H. albicans*, *altilinea*, *angustifolia*, *arachnoides*, *asperula*, *attenuata*, *Cooperi*, *cuspidata*, *denticulata*, *fasciata*, *laetevirens*, *margaritifera*, *minima*, *papillosa*, *recurva*, *reticulata*, *retusa*, *turgida* and *setata*) of which as many as 14 come from the Riversdale Division; and from the South-Eastern districts including Assegai Bosch, Port Elizabeth, Uitenhage, Grahamstown and King Williams Town, with 17 (*H. albanensis*, *altilinea*, *angustifolia*, *arachnoides*, *attenuata*, *coarctata*, *cymbiformis*, *fasciata*, *pilifera*, *planifolia*, *reticulata*, *retusa*, *subfasciata*, *translucens*, *viscosa*, *vittata*, and *xiphiophylla*). In the Great Karroo our records give a total f 14 species (*H. angustifolia*, *Bolusii*, *Chalwinii*, *Cooperi*, *fasciata*, *laetevirens*, *margaritifera*, *pallida*, *pilifera*, *planifolia*, *retusa*, *venosa* and *viscosa*). Further North the number of species is greatly reduced, *H. tesselata* extending as far up as Kimberley, while *H. tenuifolia* is found still further at Kuruman. Three species are recorded from the Transvaal (*H. attenuata*, *limifolia* and *stenophylla*), all of them found at Barberton. Turning to the Western

Districts we find two species from Van Rhyn's Dorp (*H. tesselata* and *pilifera*) and one (*H. setata*, Haw.) recently collected in Namaqualand by Mr. V. S. Peers. There is also a single species *H. Engleri*, Dinter from the Great Karasberg in South-West Africa.

W. F. BARKER.

Kirstenbosch,
November 1929.

A.—(1) *Haworthia retusa*, Haw. representing a typical Haworthia plant, $\frac{22}{27}{}^{3}$ Muir, Riversdale.
(2) Inflorescence.
(3) Flower side view x 3.
(4) Flower front view x 3.
(5) Gynaecium and androecium x 3.
(6) Gynaecium x 3.

B.—*H. pilifera*, Baker. $\frac{21}{28}{}^{2}$ Cressey, Fort Hare.

C.—*H. truncata*, Schönland. $\frac{37}{28}{}^{9}$ Wiggett, Oudtshoorn.

D.—*H. attenuata*, Haw. $\frac{18}{28}{}^{6}$ v. d. Merwe, Swellendam.

E.—*H. viscosa*, Haw., var. *pseudo-tortuosa*, Haw.

F.—Fruit and seed of *H. attenuata*, Haw. x 3.

G.—Leaf of *H. Bolusii*, Baker $\frac{15}{25}{}^{0}$, Webber, Beaufort West.

H.—Leaf of *H. tessellata*. Haw., var *inflexa*, Baker, $\frac{6}{28}{}^{6}$, du Plessis, Hanover.

I.— Leaf of *H. margaritifera*, Haw. $\frac{21}{26}{}^{7}$ Frames, 8 miles east of Worcester.

J.—Fruit x 3 of *H. denticulata*, Haw. $\frac{14}{21}{}^{3}$ Rogers, Montagu.

K.—Side view and back view of *H. variegata*, L. Bolus $\frac{19}{26}{}^{9}$, E. Ferguson, Riversdale.

L.—$\frac{3}{4}$ view of *H. limifolia*, Marl. $\frac{36}{28}{}^{7}$, Frames, Barberton.

Cultivation of the Haworthias.

THE Haworthias comprise about seventy species of the dwarf and succulent Liliaceae. They are very distinct and variable in plant and leaf, and are useful and effective alike for pot culture, or on open-air rockeries. The flowering spikes are sparsely produced, and dainty without being showy. The plants are mainly in the form of rosettes on the ground, or with leafy stems five or six inches long. A few are mainly underground with the tips of the leaves only exposed. The colouring and mottling of the leaves make up their most attractive features. Some species make a complete mass of short leafy shoots by increase of shoots at the base. Others make a matted mass from short suckers or stolons. A few remain individual plants, to be increased in numbers from seed only.

In floundering about for visible and obvious indications of their requirements under cultivation they have provided a very interesting study. Few localities are recorded in the Flora Capensis, and referring to the Garden's register their distribution is found to be mainly along the coast belt and the fringe of the Karroo, with a few on the Karroo, and inland northwards. That however does not help everybody, does not help one who has a Haworthia to grow, and is unaware of the locality and the conditions existing there.

It became apparent the only lines on which the principal requirements can be indicated are on the outward appearances or forms of the plants. At the one extreme the sun-loving, drought resisting type as H. viscosa from the Karroo. The leaves of this type are rigid and firm in texture, and of a brown or dark colour. H. tessellata and H. asperula are included here. These require full sun, and dry conditions around the plant, and at the roots. A good loamy soil, well drained, will suit them; made fairly firm in pots, and more so in the rockery in order to carry off the winter rains rapidly. Raising or mounding up the soil will help still further. A narrow crack or fissure in a rock is an ideal position under Peninsula conditions. The point is to keep as little moisture as possible around the plants in winter. The closely allied Apicras can be included with this type for cultivation.

The next group of sun-loving plants may be represented by H. Reinwardtii, H. Peacockii, and H. attenuata in the white spotted and mottled species, and H. chloracantha, in the unspotted species. These thrive admirably under ordinary pot culture, or on the rockery in well drained positions. They are largely drought resistant, but are at their best with an occasional watering during the dry summer.

The remainder, quite a number, of the Haworthias are mainly shade loving plants. The light green, turgid or bloated leaved species like H. cymbiformis and H. altilinea thrive well in sun provided the soil moisture is fairly constant throughout the year. In the rockery they are admirable for vertical recessed crevices with an Eastern

Del. W. F. Barker.

PLATE III. Haworthia.

aspect. The transparent or glassy leaved species like H. pilifera, and H. Cooperi are best in similar positions. Grown in pots or on level ground they require to be more or less underground with the tips of the leaves only exposed. When the whole of the rosette of leaves is to be constantly above ground, in the usual manner of plants, shade from direct sun is essential during the greater part of the day. This also applies to H. Bolusii, and H. arachnoides, as representing the group with numerous long teeth at the tips of the leaves. The leaves of these will not bear exposure to the sun during the heat of summer. When so exposed the leaves shrivel and dry-up to the ground level, where in natural conditions the sun's rays filter through a layer of dry sand, which protects the plant. These cobwebby plants, like the other Karroo type, will withstand prolonged drought, but under cultivation it is desirable to supply enough water to prevent undue shrivelling.

The light green, the transparent, and the cobwebby species require a light sandy soil made up of two parts leafmould, and one each of loam and sand. Efficient drainage is essential in pots and rockery. During heavy downpours, or prolonged rains in winter, it is necessary to tilt the pot plants to avoid the plants being waterlogged. In the rockery the soil splashed into the centre of the rosette should be cleaned out after rains, as well as around the base.

Increase of most species is prolific by offsets and stolons. Cuttings of the branched species readily root in a sandy soil, and some species may vegetate from the leaves. Seed germinates readily in pots of sandy soil with good drainage. Cover lightly with sand, just sufficient to hold the seeds in place. Avoid overhead watering until the seedlings are well rooted. Stand the pots in an inch or two of water until the surface of the soil becomes moist. If an airy glasshouse is not available, stand the seed pots in the shade of a building, and cover with panes of glass to conserve moisture, as well as to throw off heavy rains. Plunging the pots to their rims in loose moist soil will help to retain an even degree of moisture and warmth, assisting germination and lessening the amount of watering required. As soon as large enough the seedlings can be pricked off an inch or two apart in a similar light soil, pressing the soil fairly firm with the fingers. Protection from heavy rains should be given for the first year.

To the private grower the Haworthias provide interesting and variable material for a small rockery, the colouring, marbling, mottling, and spotting, of the foliage being very charming in their variety and range. It is the most extensive genus of small and dwarf Aloe-like succulents in existence, and easily grown under Peninsula conditions. The one or other species provides ideal material for cracks and crevices, pockets, ledges, fissures, and other awkward spots for which there is not too large a variety of suitable plants.

J. W. MATHEWS.

Kirstenbosch,
November, 1929.

The Botanical Section at the British Association.

LAST July the British Association for the Advancement of Science held its annual meeting in this country after an interval of 24 years since the previous visit.

The meetings were held in conjunction with the South African Association which was temporarily merged in the larger and older body. It is not the object at present to give any account of the meetings as a whole but merely to outline a few of the activities in regard to Botany. Nothing will be said of the general meetings or arrangements.

Section K. (Botany) was represented by about forty visitors from overseas, who formed a fair representation of botanical activity in Britain though the number of plant physiologists was small. Of the delegates, only two had taken part in the previous meeting in South Africa in 1905. Among the visitors were representatives from Canada, Australia and the United States. Botanists from all over South Africa attended the meetings.

As a guide and assistance to a flora quite unfamiliar to most of the visitors, each one was presented with the official handbook "South Africa & Science," one chapter of which deals generally with the vegetation of the Union, In addition each botanist from overseas was presented with a copy of "Botanical Features of the South West Cape"

a local handbook prepared by the Staff of the Department of Botany in the University of Cape Town.

The meetings of the Association were divided between Cape Town and Johannesburg and were held in the Botanical Laboratories of the Universities of Cape Town and of the Witwatersrand. In each centre four days of meetings for papers were held. In Cape Town the sessions were restricted to the forenoons for the most part, while in Johannesburg both morning and afternoon sessions were held. Thus, while a larger number of papers was read in the North, in Cape Town a greater amount of time was available for excursions for the study of plants and vegetation in the field. The programme of excursions was taken full advantage of by visitors from overseas, who were unanimous in their admiration of the scenery and the flora and in their emphasis on the vast number of botanical problems awaiting solution here.

During the official period of the meetings in Cape Town afternoon excursions were arranged to Lion's Head, to the vleis on the Cape Flats, and to Melkbosch Strand.

One afternoon was devoted to the National Botanic Gardens at Kirstenbosch where the section was entertained to tea by the Trustees. It was most unfortunate that this was the one occasion on which rain fell during the visitors' stay in Cape Town. An excursion to Table Mountain for the Saturday following the meetings was cancelled owing to the Aerial Cableway not being in operation and to the departure of the visitors in the early evening. A short excursion to the Camps Bay slopes was substituted.

In addition to these other excursions were arranged in the Cape Town area for those who arrived some days before the commencement of the meetings. These included a half day at Kalk Bay, and motor car excursions to the Southern parts of the Peninsula and to Sir Lowry Pass and the Steenbras Catchment Area. This last was the most extensive excursion and one of the most successful. The party were hospitably entertained to lunch at Steenbras by the Mayor of Cape Town and the City Engineer and, later in the day, to tea by Sir Lionel and Lady Phillips at their historic home, Vergelegen.

At the conclusion of the Cape Town meetings the overseas botanists left by special train for Matjesfontein and spent a day at Whitehill at the Karoo Garden before proceeding North.

Two very successful half day excursions were held from Johannesburg.

In regard to the papers that were read at the meetings little need be said here. Many will be published in full or in abstract very shortly. While no especially striking new contribution to botanical science was forthcoming, the general standard of interest was good and many interesting new facts were announced.

Of the papers, as might be expected, a considerable proportion dealt with South African problems or with questions directly related to South Africa. More than half of the papers read were given by South African botanists. These dealt for the most part with systematic or ecological aspects: included in them were some lectures, given by request, for the benefit of visitors, on local vegetation and other features. These were delivered by Professor Adamson, Professor Compton and Professor Moss.

The presidential address to the section was given by Professor A. C. Seward, F.R.S. This was delivered in Johannesburg. The address dealt with some problems of fossil botany intimately connected with the past history of South Africa. Of the South African papers it must suffice to mention those on taxonomy and associated questions by Professor Moss and his staff and students in Johannesburg, by Mrs. Levyns on the Rhenosterbush and by Miss Duthie on *Riccia*. The paper by Dr. Walkom on the fossil floras of South Africa and Australia and their correlation cannot be passed without mention.

Of papers on general botany the merest mention must suffice. Among those the more important were those by Professor Victorin on the flora of N. E. Canada, by Professor Gates on chromosome linkage, by Miss Saunders on carpels and Professor Priestley on water movements in a tree. Professor Lloyd gave a demonstration of the value of the cinematograph for botanical researches. The other papers that were read cannot be enumerated now though this lack of notice by no means implies any criticism on them.

The botanical section devoted one session to a discussion on the "Origin of the South African Flora." At this discussion the section was honoured by the presence of H. R. H. Princess Alice. The contributors to the discussion were Dr. Marloth, Professor Compton and Dr. Pole Evans each of whom gave an account of some aspects of the flora. Their contributions however, had little connection with one another and the solution of the problem before the section can hardly be said to have been brought any nearer.

The section also combined with the geological and zoological sections in a discussion on the very interesting problem of Gondwanaland. In this discussion the President, Professor Seward, was the chief contributor from the botanical side.

In addition to formal papers lectures described as semi-popular were delivered in Johannesburg by Professor Priestley on " The Water Relations of the Plant " and in

Cape Town by Dr. M. Knight on "Seaweeds." The latter might well be taken as an example of what constitutes a "semipopular" lecture.

More definitely popular lectures to the general public were given by Professor Seward in Cape Town and by Dr. Hamshaw Thomas in Johannesburg. The large audiences and the keen appreciation at these testify to the interest taken among the public outside the ranks of those privileged to join in the meetings. Dr. Hamshaw Thomas also gave a lecture in Pietermaritzburg after the meetings.

The section held a very enjoyable and successful dinner during the meetings in Johannesburg.

Finally before leaving the activities of the botanical section a word may be said on the collection of Cape wild flowers that was organised by Mrs. Bolus and Professor Compton. This was held in the Botanical Laboratory at the University of Cape Town. This exhibit, of which all the plants were named, contained some of the most showy and interesting plants in flower at the time.

The meetings and other activities of the botanical section must be regarded as having been successful. The programmes both of papers and excursions were carried through without a hitch. For this, credit is especially due to the local organisers. The section in South Africa was most fortunate in having as its president Professor Seward who is both a very distinguished botanist and an ideal chairman. South Africa showed its appreciation of Professor Seward in the award to him of an honorary degree by the University of Cape Town. The Botanical Society of South Africa also elected him an honorary Life Member.

Apart from the interest of the papers read and the value of the discussions on them, these meetings afforded a very good opportunity for the rather small band of research workers in this country to discuss problems with others. This aspect is one of the most valuable in such meetings and though the benefits may not be immediately obvious the effects will certainly be evident in the course of time. From this point of view alone it is much to be hoped that a lesser interval than 24 years will elapse before the next visit of the British Association.

R. S. Adamson.
University of Cape Town.

Book Reviews.

"A Guide to the Flora of the Cape Peninsula" by M. R. Levyns. Cape Town: Juta and Co. 1929. 15/6.

Anyone who has more than a merely aesthetic interest in plants must have been troubled by the difficulty in being able to find out the names of those that are found. This difficulty, which in the case of the Cape flora has been a very real one, has probably put off many from pursuing what would be a most interesting study and one which enhances considerably pleasure in the country when progress can be made in it.

Of course many books have been written on Cape flowers and the Cape flora. These are either beyond the average interested beginner or deal merely with a limited number of plants. So much is this the case that the identification of our wild plants has been a study restricted to the very few who have had a botanical training or who have been prepared to spend long periods of time in obtaining the necessary information. This little volume should meet this real difficulty in the path of the plant lover. Now he has a means of readily finding out the names of the families and genera not merely of conspicuous plants such as figure in the wild flower shows but of any plant growing on the Cape Peninsula.

The book consists of descriptions of the families and genera with keys for their identification. These keys necessarily group plants rather artificially in some cases but so far as tests have been made they do answer their purpose of identification.

The descriptions are short but sufficient to give the essential characters. They have been drawn up with a commendable restriction in the use of technical terms. Those that are used are explained in a clear and simple glossary at the beginning of the book.

The keys too, are based for the most part on easily recognised characters that do not call for minute examination of internal features.

The identification of any genus should be quite possible by any intelligent reader even though they have had the minimum training in botany.

As a further assistance to the beginner the book is illustrated by 194 line drawings of portions of plants which include representatives of all the larger families and more abundant genera. In addition there are five diagrams, and three of Miss Barclay's well known

coloured plates are included. This wealth of illustrations will materially assist both beginners and others in the work of identification.

The illustrations while not all of equal merit, generally give a good notion of the plant. In some cases a rather small portion has been drawn, and in one or two, e.g. fig. 97 *Podalyria*, fig. 123 *Gymnosporia*, fig. 132 *Kiggelaria*, to mention only three, the parts that have been drawn are scarcely characteristic. In the illustrations of *Fumaria* and of *Plantago* introduced species have been drawn. These are however minor criticisms and by no means detract from the value of the illustrations.

A number of the commoner introduced plants are included. Here a wise discrimination seems to have been used in deciding which to incorporate; mere strays and casuals or plants only met with where planted are not included.

The sequence of families and genera is that of Engler's system which is now very generally adopted and which is familiar in this country through Marloth's Flora of South Africa. The vascular cryptogams (Pteridophyta) are included though not illustrated, and no attempt is made to give the details of their classification.

Under each genus the number of species found on the Peninsula is given, also some notes on habitats or distribution and time of flowering. In many cases well known or conspicuous species are named. While the keys are based on those plants that occur on the Cape Peninsula the descriptions of families and genera are so given that they will apply for the most part in other parts of the south western region.

The book has a good index which includes the illustrations and common names. It appears remarkably free from misprints. Those noted are principally in the initial letters of generic names where species are cited after the descriptions. In fig. 94 *Cliffortia*, the male and female flowers are transposed.

This is a book that can be heartily recommended to all interested in our native plants. It is one that will be found useful to both teacher and pupil, both to the trained botanist and to the amateur and to the beginner.

The publication of such a book as this on the genera and families inevitably gives birth to the wish that it may be followed by one dealing with the individual species on similar lines. That the writing of such a book is by no means a light task is freely admitted, but the present work marks such an advance in the accessibility of knowledge of our flora that the hope is raised that it may be looked upon as a step towards the goal of a good excursion flora of the Cape Peninsula.

R.S.A.

"The Botanical Features of the South Western Cape Province" Cape Town: Specialty Press: pp. 127. Price 4/6 post free.

The recent visit to South Africa of the British Association for the Advancement of Science has been responsible for the appearance of several books and pamphlets, some of which are of little more than ephemeral interest while others are of permanent value. The little volume published by the Specialty Press under the title 'The Botanical Features of the South Western Cape Province' is an important contribution to botanical science and contains within its 127 pages much valuable information in a most readable form. The book consists of eleven essays by five well-known South African Botanists who are specialists in the various branches which they discuss. Professor Adamson is responsible for the introduction, which deals briefly with the physical features and climatic features of the area under consideration, and also for an account of its vegetation — treated from the standpoint of ecology—with special reference to the plant communities of Table Mountain. Throughout this essay the modern concept of succesion is emphasised and the alteration of the plant cover resulting from frequent burning is discussed. Mrs. Levyns contributes a sketch of the systematic elements of the South-Western vegetation in which the exceedingly rich and interesting flora of the Cape Peninsula is briefly considered. A concise account of the sea-weed flora of the Peninsula by the same author occurs later in the volume. Professor Compton describes the vegetation and flora of the Karoo under six geographical subdivisions, the area in the neighbourhood of Whitehill and Matjesfontein being treated in considerable detail. Special mention is made of the changes in vegetation due to overstocking and the response of the Karoo flora to aridity and grazing. The same author contributes essays on the Archegoniatae of the South-West Cape, Economic Plants in the South-West Cape Province, and the National Botanic Gardens of South Africa. The fresh water aquatic vegetation—cryptogamic as well as phanerogamic—of the South Western Districts in general and the Cape Division in particular is described by Miss Stephens under the convenient subdivisions of seasonal vleis and ponds, lagoons, marshes, permanent vleis, streams and reservoirs. A general review of the fungous flora is given by Dr. van der Bijl, Professor of Mycology of the University of Stellenbosch.

The book is well printed and published at a reasonable figure, and it can be heartily recommended to students of our South African vegetation and flora. Though intended primarily for the botanist, the non-scientific reader will find much in it to interest and instruct. A.V.D.

The Botanical Society of South Africa.

ANNUAL REPORT, 1928.

The Council has pleasure in submitting the 16th Annual Report of the Society.

MEMBERSHIP.—The Membership of the Society stands at:—

Life Members	66
Family Members	54
Ordinary Members	581
Associate Members	345
Total	1,046

Which is an increase of 43 as compared with last year. It is gratifying to record this growth of membership, but it is felt that many more would join if approached by those who now enjoy the privileges of membership.

ANNUAL GATHERING.—The Annual Gathering of members and their friends was held at Kirstenbosch on Saturday, 13th October, 1928, and was well attended, Sir James and Lady Rose-Innes receiving the guests. Addresses were delivered by Sir James Rose-Innes and Professor Compton, the Director of the Gardens. After tea, parties were conducted round the Gardens to view the progress which had taken place during the past year.

MEETINGS OF COUNCIL.—Four Meetings of Council were held during the year, which were well attended. At the Annual General Meeting the following office-bearers were elected: President, the Rt. Hon. Sir James Rose-Innes, P.C., K.C.M.G.; Vice-Presidents, Sir Lionel Phillips, Bart.; Sir Max Michaelis, and Sir Lewis Michell, C.V.O.; Members of the Council, Sir Drummond Chaplin, K.C.M.G., M.L.A., Professor R. H. Compton, Professor Adamson, Mrs. F. Bolus, Mrs. H. Carter, Mrs. H. S. van Zyl, Miss F. A. White, Wm. Duncan Baxter, P. Stuart Horne, F. E. Cartwright, *Hon. Secretary and Treasurer*, W. de N. Lucas, Major G. B. van Zyl, Dr. Lilian Robinson, Miss E. Struben, Miss D. Fairbridge, Lady Phillips, W. A. Eaton, Dr. Bennie Hewat, H. C. Starke, P. Ross-Frames.

JOURNAL.—The fourteenth volume of the Society's Journal was published in January, which proved a most interesting addition to those previously issued, although slightly smaller than before; it contains, in addition to two coloured and two half-tone plates, most instructive and interesting articles on Gladiolus by Mrs. Frank Bolus of the Bolus Herbarium, and Mr. J. W. Mathews, Curator of the National Botanical Gardens. Too much stress cannot be laid on the importance of the value of this publication to the Society—through its publication many enquiries come from overseas which frequently result in addition to membership.

CONTRIBUTION TO NATIONAL BOTANIC GARDENS.—As will be seen by the financial report and balance sheet, the surplus for the year amounted to £556 14s. 10d., the largest yearly amount so far derived from membership fees after deducting working expenses and cost of printing the Journal.

SEED LIST.—The Seed List published by the National Botanic Gardens was circulated to all members as an inset to the Journal, and numerous applications were received at Kirstenbosch for seeds. It is clear that the privilege enjoyed by members of sharing in the *gratis* distribution of seeds from the Gardens is much appreciated. In this way members are able to obtain many indigenous and exotic plants which have been unobtainable hitherto, as they are not included in the lists published by regular seedsmen.

PROGRESS AT KIRSTENBOSCH.—Members of the Society also received copies of the Annual Report of the National Botanic Gardens for 1927, and in this way were kept in touch with the progress of the Gardens. The report indicates an increase in all the various activities at Kirstenbosch. Considerable extensions were made in the Protea and Heath Gardens. The number of contributions of plants and seeds received constituted a record, namely, 2,841, coming from 207 different contributors all over the Union.

The number of visitors to Kirstenbosch was also a record, the week-end and holiday figures showing a total of 62,383, or nearly 10,000 more than the previous year. On the financial side it is very gratifying to note that the Government promised to increase the annual grant-in-aid to £2,000 for 1928-29, rising by £100 annually to £3,000; and it may be recalled that in pressing for an increased grant the Trustees of the Gardens have been able to point to the increased public interest in Kirstenbosch as witnessed by the growing membership of the Botanical Society.

GRANT FROM LIFE MEMBERS' FUND.—During the year your Council sanctioned a grant of Three Hundred Pounds (£300) from Life Members' Fund in response to an application from the National Botanic Gardens for the completion of the New Succulent Garden, which work was commenced at the end of 1927; the whole work will now have been financed by the Society from its Life Members' Fund, in pursuance of the policy of using this fund for definite development work at Kirstenbosch. As will be remembered, during the previous year a similar sum had been granted. This valuable addition promises to form one of the most interesting features of the Gardens, both from a scientific and spectacular point of view.

Although the Membership Roll shows very steady progress, members are urgently requested to interest their friends in the organisation by inducing them to become members of the Society, as the annual contribution derived from membership fees to the National Botanic Gardens is of very material assistance in carrying on the ever-increasing work. It must be apparent to those who visit Kirstenbosch that as progress takes place so does the cost of maintenance increase; and without the necessary funds to maintain, money spent on development would be wasted. The Hon. Secretary will at all times be pleased to receive the names of those whom it is thought might be interested in the welfare of the Society.

The Council regret to record the deaths of the following members during the year:—

Sir Lewis Michell, C.V.O.; C. E. Westerton, Esq.; A. L. Blackburn, Esq.; P. H. de Villiers, Esq.; T. Henshilwood, Esq.; Dr. S. P. Impey; J. C. Rimer, Esq.; Mrs. E. A. Lankester; Mrs. M. L. Struben; Miss C. Thorne.

THANKS.—The Council has to express its indebtedness and sincere thanks to Mr. R. L. McDonald, for having audited the accounts; to the City Council and the South African Association, for use of rooms for the purpose of meetings; also to the Press, for their valuable assistance in reporting the affairs of the Society.

LIONEL PHILLIPS.
Chairman.

THE BOTANICAL SOCIETY OF SOUTH AFRICA.

BALANCE SHEET as at 31st December, 1928.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Life Members' Fund 1/1/28	680 0 0		Union of South Africa 5% Stock 1929/1939 at cost	300 0 0	
Added during year	100 0 0		Accrued Interest	4 7 1	
	780 0 0				304 7 1
Less amount voted towards construction of succulent garden at Kirstenbosch	300 0 0		Cape of Good Hope Savings Bank Society, plus accrued interest		102 16 0
		480 0 0	Debtors for Advertisements in Journal		21 5 0
Subscriptions paid in advance		56 12 0	Cash at Bank		778 9 11
Specialty Press of S.A. Ltd.		113 11 2			
National Botanic Gardens, surplus for 1928		556 14 10			
		£1,206 18 0			£1,206 18 0

Revenue and Expenditure Account for 12 months ended 31st December, 1928.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Annual Gathering at Kirstenbosch	24 4 11		Subscriptions—		
General Expenses	36 8 6		Family	124 19 0	
Clerical Assistance	30 0 0		Ordinary	503 15 4	
Bank Charges	3 12 4		Associate	88 1 3	
Stationery, Printing and Advtg.	20 6 6				716 15 7
Journal, 1928 (less Advertisements)	77 0 2		Donations		5 0
		191 12 5	Sales of Journals		1 18 8
Surplus for 1928		556 14 10	Interest		29 8 0
		£748 7 3			£748 7 3

Audited and found correct,
R. L. McDONALD,
Auditor.

Cape Town,
11th March, 1929.

(Signed) LIONEL PHILLIPS,
Chairman.
FRANK E. CARTWRIGHT,
Hon. Treasurer.

List of Members of the Botanical Society.

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary, P.O. Box 267, Cape Town.

A.

Abbey, W.
ABBOTT, W. C.
Abercorn, Duke of
Abernethy, Miss O.
ACKERMANN, MRS. C. J.
ADAMSON, PROF. R. S.
Ailsa, The Marquis of
Ainslie, Miss F.
AKERMAN, CONRAD
Albrecht, C. W.
ALBU, SIR GEORGE, BART.
Alderson, Miss D.
Alexander, A.
Alexander, Miss E.
ALI, H. H. PRINCE MOHAMED.
Allison, J.
Allison, Mrs. J.
Alston, Dr. J. A.
Alston, Mrs. J. A.
Anders, Dr. H.
Anderson, Mrs. C. L.
Anderson, E. B.
Anderson, Mrs. Murdoch
Anderson, Mrs. T.
Andersson, E. J.
Andersson, Mrs. E. J.
APSEY, T. J.
Arbuthnot, Miss I.
Arehbell, Mrs. J. E.
Arderne, H. R.
Arkwright, J. A.
Armstrong, W. H.
Arnold, Dr. G.
Arnot, Miss
Askew, F.
Astrop, J. H.
Atwell, A. B.
Augustus, I. S.

B.

Babbs, A. T.
Babbs, Mrs. A. T.
Bacon, Lt. Col. A. D.
Backhouse, J. S.
Backhouse, Mrs. J. S.
Bahlcke, Miss W.
Baillie, Mrs. B. M.
Bain, W. G.
Bain, Mrs. W. G.
Baker, Mrs. C.
Baker, Lionel
Baker, Mrs. M. A. Watson
Balfour, A. P.
Ball, W. R.
Ballantine, Dr. A. J.
Banks, Mrs.
Barclay, Miss E.
Barlow, W.
Barnard, Prof. T. T.
Barnes, Mrs. H. R.
Barr, P. R.
Bartlett, Miss G.
Basson, Miss M. M.
Basson, N. J.
Bates, J. T.
Battenhausen, C. F.
Battenhausen, J. W.
Battenhausen, Mrs. J. W.
BAXTER, W. DUNCAN
BAXTER, MRS. W. DUNCAN
Beale, O. C.
Bean, D.
Bean, H. E.
Beard, Miss H.
Beard, H. R.
Beard, Mrs. W. A. M.
Beattie, Sir J. C.
Beattie, Lady
Beck, Lt.-Col. A. A.
Beck, Mrs. A. A.
Beck, Lady Meiring
Beck, T. E.
Becker, Mrs. D.
Becker, T.
Bedford, H. J.
BEIT, SIR OTTO
Bell, A. B.
Benjamin, Hon. Mr. Justice L. E.
Bennet, H.
Bennet, Mrs. H.
Bennett, A.
BENNING, A. F. J.
BENTINCK, VICE-ADMIRAL SIR RUDOLF
Bergh, Miss J. C.
Bernard, Mrs.
Berry, H. O. W.
Bertie, Hon. A. M.
Bertram, Mrs. M. E.
Beverley, Miss M.
Bevis, A. L.
Bisset, W. M.
Blackbeard, Miss G. I.
Blackburn, H. W.
Blake, Mrs. A.
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(*b*) To augment the Goverment grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch.

(*c*) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

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THE JOURNAL OF THE BOTANICAL SOCIETY OF SOUTH AFRICA

Edited by R. H. COMPTON, M.A., F.R.S.S.Af., Director of the NATIONAL BOTANIC GARDENS

Part XVI. 1930

KIRSTENBOSCH
NEWLANDS, C.P.
SOUTH AFRICA

Published under the authority of the Council of the Botanical Society

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PLATE I.—Orothamnus Zeyheri.

Photo: R. A. H. Flugge-de Smidt.

The Journal of the Botanical Society of South Africa.

EDITED BY R. H. COMPTON.

PART XVI 1930

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News and Notes.

HER Royal Highness Princess Alice, Countess of Athlone, has honoured the Botanical Society by becoming a Life Member.

* * * * *

It is satisfactory to be able to record a further increase in the membership of the Botanical Society. All classes of membership show growth during the past year. The following table gives the figures since the foundation of the Society.

	Life.	Family.	Ordinary.	Associate.	Total.
1914	33	22	264	33	352
1915	46	26	263	32	367
1916	49	26	264	45	384
1917	46	24	249	53	362
1918	49	28	281	78	436
1919	50	38	320	84	492
1920	54	45	384	237	720
1921	54	48	407	287	795
1922	55	52	418	301	826
1923	59	50	405	269	783
1924	62	57	455	313	887
1925	62	58	462	330	912
1926	65	60	481	341	947
1927	68	60	522	353	1003
1928	66	54	581	345	1046
1929	69	57	625	382	1133

* * * * *

The steady growth of the Botanical Society during its fifteen years of life is an encouragement to those who order the affairs of Kirstenbosch. It is testimony to the growing appreciation of the work that is being carried out and of its value to individuals as well as to the Union as a whole.

The Botanical Society can look back on valuable assistance rendered year by year to the general work of the Gardens. It can also take pride in the achievement of definite pieces of construction work carried out largely or entirely by means of grants from its Life Members' Fund. The rock work in the Fern Dell, the development of the Aloe Kopje, the building of the Tea House, and, most elaborate of all, the construction of the new Succulent Garden, have all been made possible and financed directly by the Botanical Society.

The rockwork of the Succulent Garden has won praise from many competent to judge and what is even more important, the plants have shown every sign of appreciating their new home. Many of the most difficult subjects have come satisfactorily through the winter in the open and can probably be regarded as permanent inhabitants of the Garden. The era of tins in the Nursery is happily over as far as the majority of the succulents are concerned, and once more the real economy of spending money on proper construction work is demonstrated.

* * * * *

The Succulent Garden is not yet complete, but it has been thought wise to call a temporary halt in the construction work. Further rockwork will be necessary at the east end of the Garden, and future development will link it up with the new work on the south side of the Fern Dell, the Mesembryanthemum Bank and the newly laid-out area at the Entrance Gates.

* * * * *

At present development is taking place on the south side of the Fern Dell and in the Cycad Amphitheatre. Storm-water drainage has been laid through this area, only the old nursery site now remaining to be completed. The main path down the Dell is being permanently constructed. The paths among the Cycads are being properly graded, provided with steps and cobbled, and the banks are being supported by low walls of rough stone. A great improvement in appearance may be noticed, and the Cycads themselves have acquired a new dignity from their surroundings. This work is being financed by grants from the Capital Funds of the Gardens, derived from bequests and donations.

* * * * *

Dr. A. W. Hill, C.M.G., F.R.S., Director of the Royal Botanic Gardens, Kew, is paying a two months' visit to South Africa at the invitation of the Union Government. During part of his time in the Western Province he was a guest at Kirstenbosch and was shown many sides of the work of the Gardens and the Bolus Herbarium. He also paid a visit to the Karoo Garden at Whitehill. In an interview with a representative of the "Cape Times" Dr. Hill made the following statements: "In Kirstenbosch,"

he said, "you have one of the finest things of its kind to be found in any city or any country in the world. It is a wonderful heritage. There is nothing like this wonderful wealth of natural and native vegetation anywhere else, and botanists all over the world look to South Africa to maintain Kirstenbosch and Table Mountain as a reserve, if possible.. . . . . The botanical gardens at Kirstenbosch are a wonderful tribute to the work of the late Professor Pearson and his successor, Professor Compton. The Gardens deserve all the support that everyone in South Africa and elsewhere can give them. More funds are needed to make the most use of the Garden and develop the scientific side of the work at Kirstenbosch. No country in the world has such a chance of developing useful and scientific work as you have here, and this work will be of value to the whole of South Africa."

* * * * *

The Botanical Society entertained Dr. Hill to lunch at the Hotel Assembly, Cape Town, on 13th November, together with his sister Miss Hill and his cousin Miss Hardenberg. The President, Sir James Rose-Innes, announced the conferment upon Dr. Hill of Honorary Life Membership of the Botanical Society. Dr. Hill is the fourth person to receive this honour, the others being Mrs H. H. W. Pearson, Dr. R. Marloth and Professor A. C. Seward.

* * * * *

Botanical science and horticultural practice are the poorer by the death of Ernest Henry Wilson, who was killed in a motor accident in America on 15th October. He had travelled and collected extensively in China and Japan, and enriched the gardens of the north temperate regions with innumerable new and attractive plants, mainly trees and shrubs. He was the author of a dozen books on horticultural subjects, noteworthy by their knowledge and attractiveness of presentation. In 1927 he became Keeper of the Arnold Arboretum, "America's Greatest Garden," to use the title of one of his books. He visited South Africa in 1922, and it was the writer's privilege to show him Kirstenbosch. Afterwards he wrote "It was a great pleasure to me to at last find one botanic garden devoted to the preservation of the local flora and to the cultivation of indigenous plants. In this country you have a wonderful variety of lovely and unique plants to draw upon, and I can foresee the day is not very far distant when your garden will rank among the foremost in the world."

The recent sudden death of Professor C. E. Moss, Professor of Botany in the University of the Witwatersrand, removes from us one of the ablest and most vigorous personalities in the botanical world. He came to South Africa twelve years ago with a high reputation for work both critical and brilliant in British field botany, and as one of the founders of modern ecology. Much of his work in England — notably the splendidly conceived and begun "Cambridge British Flora" — had perforce to be left unfinished. In South Africa he threw himself into the study of the flora with a critical zeal which was an inspiration and an object lesson to his colleagues. His untimely death robs his work of its fruition, but in his herbarium and notes future students will find light on many an obscure problem of taxonomy.

* * * * *

The Edward Muspratt Solly Scholarship for 1930 was awarded to Miss W. F. Barker, this being her second year of tenure. In this number of the *Journal* is printed an article by Miss Barker on the interesting Cape genus Lachenalia accompanied by a plate illustrating the characteristic features of the genus. Mr. J. W. Mathews, Curator of Kirstenbosch, contributes an article on Lachenalia from the gardening point of view, which will be of value to those who wish to take up the culture of one of our most charming genera of bulbous plants.

* * * * *

The frontispiece of this Part of the *Journal* is from a photograph taken in the field by Mr. R. A. H. Flugge-de Smidt, and represents one of the most beautiful and at the same time one of the rarest botanical treasures of the Cape — *Orothamnus Zeyheri*, the "Marsh Rose." The localities in which it grows are known only to about half a dozen Europeans *and* to the wild-flower gatherers. So far all efforts to grow the plant, whether from seeds or by transplantation of seedlings, have failed; and the species has not yet, therefore, received the protection from extinction which Kirstenbosch might be able to give it. Like many other Proteaceae it appears to be readily possible to kill the plant outright by cutting it back: the old wood being unable to "break" into new growth. Mr. Flugge-de Smidt, in his short article, demonstrates that this is exactly what is happening. The plants are killed and the possibility of reproduction from seed is removed simultaneously. This is being done, with the consent of the authorities, for the brief glory of a flower show.

We publish a short article by Mrs. M. R. Levyns, Lecturer in Botany in the University of Cape Town, on one of the best known and least liked indigenous plants, the Rhenoster bush. Mrs. Levyns' work is laying a scientific foundation for better veld management in the Cape Province. When farmers realise that the prevalence of Rhenoster bush on their farms is evidence of bad farming for all to behold, there will be some chance of improvement being effected, and the value of their farms increasing.

* * * * *

Professor F. E. Lloyd of McGill University, Montreal, who visited South Africa last year, took the opportunity of studying *Utricularia capensis*, a minute flowering plant abundant on Table Mountain and elsewhere, which captures and digests small animals in special traps. He was able to elucidate the very curious mechanism by which the trap operates and the way in which the animals are swept inside, never to escape. Professor Lloyd has contributed a detailed account of his work to these pages; and many will be enabled to admire both the "ingenuity" of the trap and the skill with which Professor Lloyd has elucidated the *modus operandi* of this tiny piece of mechanism, one twenty-fifth of an inch or less in diameter.

* * * * *

How can we best protect our flora from the destruction which every year advances a further stage? Veld-burning, flower-picking, the development of agriculture, the planting and spread of exotics — these are the chief enemies of the indigenous flora. Agriculture and Forestry are inherent in the development of the country: the damage they do is final and absolute, but is inevitable so long as population and human needs increase. This is why all true lovers of the natural beauty and the flora and fauna of the country should see that definite areas of ground — large Natural Parks and smaller local Nature Reserves — should be established all over the Union, so that some remains of our unique natural possessions may be handed on to our successors as they came to us.

* * * * *

Veld-burning has been so often referred to as an arch-enemy of the beauty, wealth and fruitfulness of the country that it might seem that further emphasis on the subject is unnecessary. Unfortunately this is not the case. The Government has launched a campaign against "erosion," and if it can induce farmers, road and railway engineers and others to tackle this evil it will be doing valuable work. But erosion is very largely an effect — one of the many evil effects — of veld burning. And the Government hesitates and hesitates again to deal with the main problem.

* * * * *

So long as veld burning is permitted — and indeed encouraged by the apparent apathy of the authorities — it may appear futile to attempt to protect the flora against the seemingly small destruction due to flower-picking. Why bother, it may be asked, to prevent a flower-gatherer taking a few gladioli or heaths off a mountain side when next day a grazier may destroy ten thousand morgen of vegetation in one conflagration and receive not even a reprimand for doing so? And as an able writer in the "Riversdale Advertiser" says "As long as veld-burning is permitted to destroy a hundred or ten hundred plants to one due to flower picking it will merely serve to provide a grievance to a class which is already giving rise to a sufficient number of problems in South Africa."

* * * * *

But the flower-picking problem is worth tackling because the gathering of wild flowers is highly selective. That is, it definitely reduces the number of the most beautiful species, preventing them from reproducing by seed and often by bulbs, and favours their less attractive competitors. Moreover, the commercial flower-gatherer is himself frequently responsible for starting veld fires in order to stimulate temporary flowering.

* * * * *

The new Wild Flower Protection proclamation of September 1930 follows the lines of its predecessors and contains the same inherent difficulties which have reduced them to futility in practice. At first glance the regulations are stringent in the extreme and are apparently well calculated to put an end to much of the wild flower trade and to some private picking also. They are however qualified by departmental rulings on what constitutes "cultivation," and these will give precisely the same difficulties to police and magistrates as before. What with the current views as to land-owners' rights, the non-patrolling of Crown lands and the determination of a certain section of the public to purchase protected flowers, the new proclamation will hardly succeed where the previous ones failed.

* * * * *

The Council of the Botanical Society has discussed the protection problem and a sub-committee has drawn up a memorandum on completely new lines which is now under

consideration. This recommends, broadly speaking, that future legislation should have as aims (1) the total prohibition of the sale of indigenous flowers, plants, etc., taken from the wild, (2) relaxation of the present restriction on plucking by private individuals, (3) encouragement of the cultivation of indigenous plants by growers licensed and inspected for the purpose. The Council of the Botanical Society invite and would greatly value any criticisms and contributions to the discussion from members.

* * * * *

It may be pointed out that the problem does not merely concern "wild flowers": of equal or even greater importance is the digging up of bulbs and succulent plants for sale and export. Extinction threatens some of these. The remedy is to encourage cultivation for commercial purposes: at present the legitimate nurseryman is subject to a form of competition detrimental to him and to the interests of the country generally.

* * * * *

The Cape Peninsula Publicity Association, in conjunction with the Railway Publicity Department, have just issued a brochure on Kirstenbosch (with paragraphs on other public gardens in the Cape Peninsula). By the courtesy of these bodies, to whom the Botanical Society is greatly indebted, a copy of this Guide is being sent as a gift to members and associates of the Society. The Guide contains a new plan of the Gardens drawn by Miss F. R. Grant, photographs by Mr. A. R. van Oudtshoorn, and a text describing the history and principal features of Kirstenbosch, both the cultivated and the wild portions.

* * * * *

The first set of picture post cards of Kirstenbosch will shortly be issued. They are taken from water colour paintings by Mr. C. S. Groves and Miss D. Barclay and will provide an attractive souvenir of the scenery and colour of the Gardens. Each card, moreover, will bear an invitation to membership of the Botanical Society.

* * * * *

Professor and Mrs. Compton returned to South Africa on 2nd August, after a tour in which they had visited Ceylon, Penang, Sumatra, Java, Singapore, Hong Kong, Shanghai, Japan, Hawaii and the United States. Professor Compton studied many botanic gardens in the course of this tour, and a short article on Peradeniya and Buitenzorg is printed in this *Journal*. During his three months in America he visited many of the great National Parks which are so important a part of the life of the United States. His tour was partly financed by a Visitor's Grant from the Carnegie Corporation of New York.

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In replying to advertisements on the cover, readers are kindly requested to mention the *Journal of the Botanical Society*.

The Structure of the Trap of Utricularia capensis.

By FRANCIS E. LLOYD, *Macdonald Professor of Botany, McGill University, Montreal.*

JUST previous to the meeting of the British Association for the Advancement of Science at Capetown in 1929, I had the opportunity of studying in the living condition the traps (or bladders as they have usually been called), of the very delicate little species of Utricularia to be found in the vicinity known as *U. capensis*. I found growing but not flowering material with the help of Mrs. Frank Bolus within the domain of the National Botanic Gardens at Kirstenbosch, and later I found it alone near the top of Table Mountain. I had also living material from Mr. E. J. Steer, so that, though I had little time, there was plenty of material to work on. The species turned out to be so extraordinary and so curiously specialised, that I venture to offer a description in these pages.

When we say "extraordinary," however, a comparison is involved, in this case a comparison with the well-known *U. vulgaris* and *gibba*, two species which have furnished material that has permitted us to arrive at some understanding of how the traps work. Many details of structure

and development of the traps of these and other closely related European species have been known since the studies of Cohn and Meierhofer, and many of the peculiar features of exotic tropical New and Old World species have been described chiefly by Goebel and by Luetzelburg. Many of these species are terrestrial, so called, being accustomed to occupy a substratum more or less compact but abundant of water. *U. capensis* is of this sort, growing, as all Cape botanists know, in wet sand and mossy places where water trickles through. Many species are however freely floating in habit, *U. vulgaris* and *gibba* being examples, and one who is interested will at once wonder how similar these two habitat groups are in respect of the traps which seem to be adapted particularly to a freely floating habit.

Plant Physiology, vol. 4, 1929, and a detailed historical account with a full description, as it was then understood, of *U. vulgaris*, by A. F. Skutch, occurs in The New Phytologist for 1928. If one desires to study the subject in such a way as to appreciate it from the historical point of view, one should read Meierhofer, Darwin, Goebel, von Luetzelburg, Merl and Czaja. It will then be seen how difficult it has been to arrive at a correct conception of the mechanism of the trap. As to the physiology of it we are still very much in the dark, as I shall indicate.

The Case of Utricularia gibba.

This is a small freely floating species with relatively large traps, 2 to 3 mm. long, which, viewed laterally,

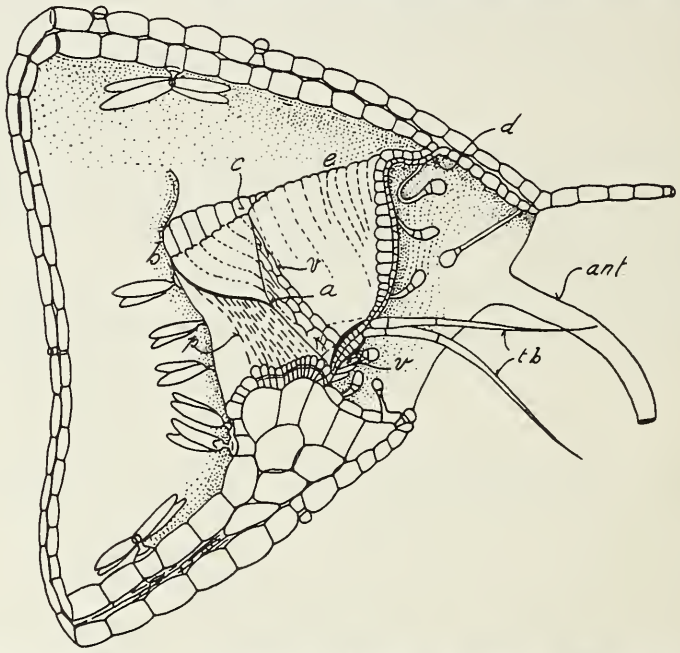

Fig. 1.

Sagittal section of the door mechanism of the trap of *Utricularia gibba*. *ant.*, base of antenna; *bd.* attachment of door to wall of trap; *ca*, line of fold; *v.* velum, or membrane which seals the door; *p.* pavement epithelium; *tb.* the tripping bristles. The door; *p.* pavement position.

As a matter of fact so far as I have been able to examine the group, (I have studied 24 species), I am able to say that there is no fundamental difference, but that there is a considerable variety of secondary difference, just as two locks may differ in design but work according to the same principles. In order therefore to make it clear to the reader in what directions *U. capensis* is peculiar I shall first of all describe briefly the mechanism of *U. gibba*, a common species in the greenhouses of McGill University. A fuller and more detailed description may be seen in

are somewhat obliquely pear shaped, with the attaching stalk at the side of the thick end. Edge-wise, the trap is seen to be flattened, and in most cases, when the plant has been not too roughly handled, the sides are concave. This is due to the fact that the traps are collapsible and have the physiological peculiarity of pumping out the water sufficiently to put the sides in a position of strain, which if released, results in a sudden outward bending so that the trap now appears appreciably rounder and holds much more water. This can be shown to occur experi-

mentally merely by puncturing a collapsed trap with a very fine sharp needle, when it at once expands as water rushes into the interior through the wound. In normal surroundings this happens when the door is sprung, and this is always a sudden act. Furthermore since the walls when collapsed are always straining outwardly, tending to pull water in, though at the same time by virtue of their physiological properties they are exhausting the water, it is clear that the door must be water-tight, otherwise the in-leaking water would nullify the exhausting suction of the walls. Only when the door-latch is released can water enter, when it does so as a rapidly inrushing current which

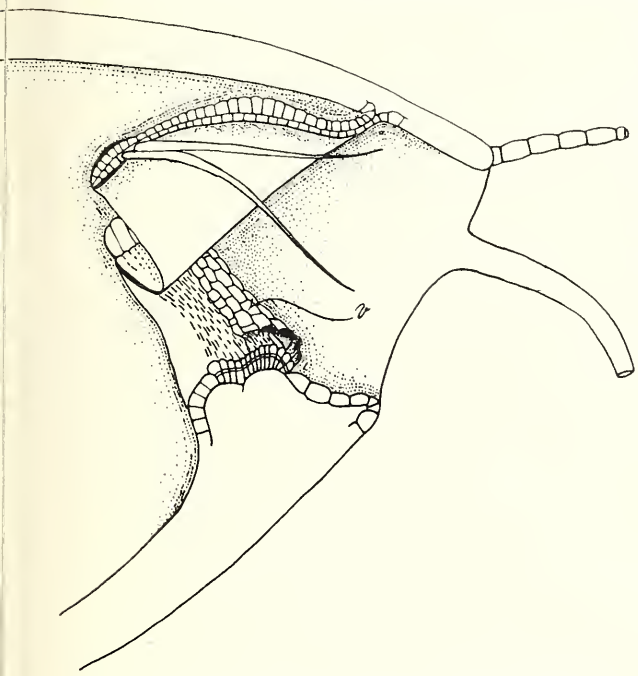

Fig. 2.—The same as fig. 1, but here the door is in the open position. The velum is seen to better advantage, in the relaxed position.

stops only when the out-bending walls approach an equilibrium. Since the door shuts again with a spring action, it is the door which cuts off the current of water before it stops flowing in springing back into its normal water-tight position.

Assuming the automatic act of exhausting water from the interior of the trap (this is the physiological part of the matter which we do not understand) setting the sides in a position of strain or unstable equilibrium, we may turn our attention to the mechanism of the door which closes and latches itself and becomes water-tight automatically. To explain this we must have recourse to the accompanying diagram (fig. 1) which shows the whole mechanism cut in two lengthwise. The door itself is a flexible structure of about the shape of a half of a bowler hat. It is attached above to the walls of the trap by a wide flexible hinge running in a semicircular line beginning at one inner angle of the threshold and passing around to the opposite side. When the door is properly closed, as it is in the diagram, the lower free edge rests against an outwardly facing ridge on the threshold and presses against this with an inward and downward thrust. This thrust is due in part to its own elasticity, but far more to the pressure of the outer water against it. It will be noticed also that the lateral reaches of the door edge pass across the threshold from the points *e* and to *d* (fig. 1), so that, in these regions there is no ridge to take up the thrust. Furthermore this very circumstance gives rise to a fold in the door extending between the points *d* and *c* (fig. 1) and this makes a place on each side where water could readily enter were it not for another structure which has until recently escaped observation. This consists of a membrane which arises by the exfoliation of the cuticle

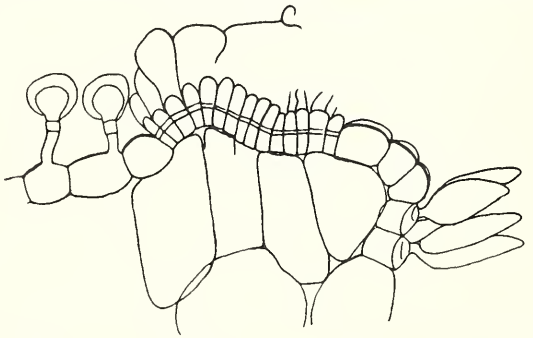

Fig. 3.—Diagram, on a larger scale, of the threshold to show better the velum and the origin of it.

of the cells forming the upper surface of the threshold, called by Goebel the pavement epithelium. The cuticle first balloons away from the cells, and then is torn away from the more inwardly placed cells but remains attached to the outermore (fig. 3). As the door closes it pushes this membrane before it, and the edge then comes to rest in a sort of pocket formed between the membrane and the ridge which receives the thrust. The pressure of the water is exerted as well on this membrane as on the door, and as the membrane covers the slits formed one on each side

of the door by its folds, these slits are also stopped effectively.

Attention must be drawn to another feature of the door namely the thin place just above the stiff bristles. This is a circular area which can be easily bent by light downward pressure on the bristles, so that the door edge can be bent as indicated by the broken line. When this happens the pressure of water pushes in the door and for a brief fraction of a second it takes up the new position indicated by the following figure (fig. 2). The column of water then rushes in, to be cut off as it slacks by the door backwardly springing into its closed position. The traps then becomes reset in the course of a half-hour more or less, by exhaustion of the water from within. It will be seen that it requires for the springing of the trap the accidental touching of the forwardly directed bristles by some little animal, a worm or copepod or water spider, etc., when the unfortunate beast will be carried into the trap by the inrush of water. It was previously thought that the edge of the door merely rested on the upper

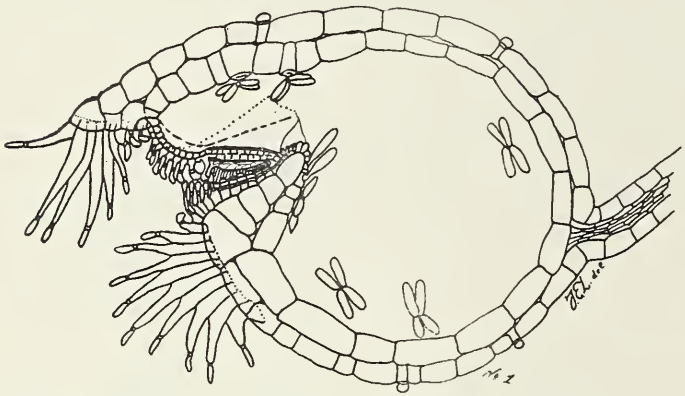

Fig. 4.—*Utricularia capensis.* An entire trap seen in sagittal section.

surface of the threshold, (Czaja) or even exerted an outward thrust against the ridge (Brocher) and resisted the water pressure by its own stiffness. Some attempt has also been made to attribute the water tightness to a stoppage of mucilage, but the inadequacy of this idea will be apparent when it is realised that soft mucilage could hardly act thus, and that the door could not act suddenly were it not for a latch action. Withycombe indeed felt this and tried to show that the door edge catches hold on the edge of the pavement epithelium, but did not fully comprehend the facts. He probably also saw some traces of the membrane but if he did, mistook them for mucilage.

For the rest it may be added that the entrance and the outer surface of the door are armed with a large number of glandular hairs some of which are indicated in the diagram sufficiently to indicate their shape and position. They have been thought to constitute a lure to attract small water animals, but others, as well as I, have watched the movement of such animals in the vicinity of the entrance

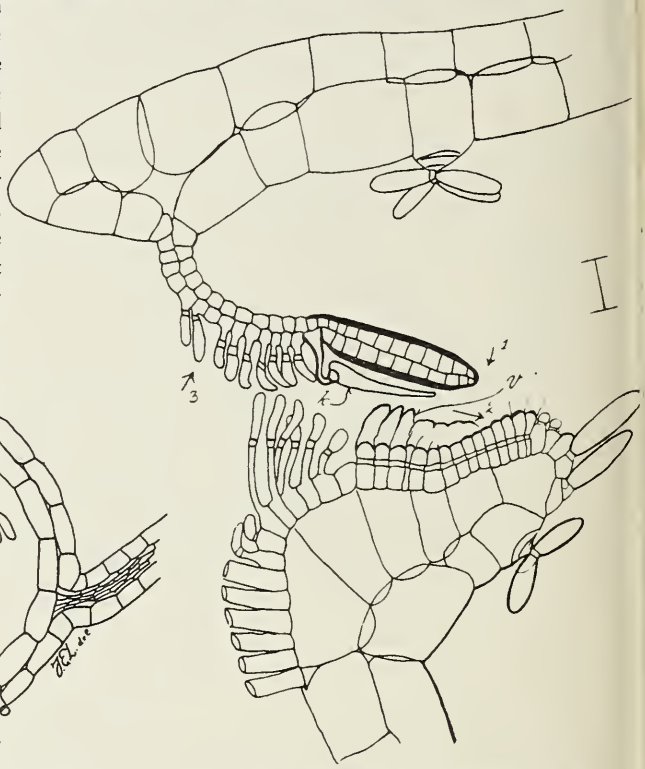

Fig. 5.—*Utricularia capensis.* The door mechanism on a larger scale than that of fig. 4. Arrow point 1, direction of thrust of the door due to its own mechanical properties; arrow point 2, thrust due to pressure of the outer water on the door; arrow point 3, direction in which local pressure must be applied to spring the door. In this diagram the door is represented as raised above the threshold to the extent of the stopped line.

without seeing any convincing sign that they are attracted. The entrance is also further armed with antennae, as Darwin called them, which together with some additional bristles forms a sort of guide to the mouth of the trap. But I have watched in vain hoping to see them working effectively in this way. Nevertheless, animals do get

aught and that right frequently and promptly, so that when a plant is put into an aquarium with a lot of daphnids in it, they quickly manage to get into trouble. I have counted 21 of these little beasts in one trap.

Most of the freely floating forms answer to the above description, allowing for specific differences. Doubtless there are such species to be found near Capetown.

If so, one who will fully appreciate the comparison now to be made would do well to examine carefully the traps of such species in the light of the foregoing description.

The Traps of Utricularia capensis.

Plants of this interesting species must be carefully removed from the rather solid substratum in which they grow in order to avoid tearing off the traps. Mr. E. J. Steer, of Capetown, has grown it in his outdoor aquaria as a nearly freely floating form, and hence it is more easily studied. The traps are very small, usually about 1 mm. long, but may be .3 to .5 mm. longer exceptionally. The external appearance differs very much from that of *U. gibba* in that there are no antennae. Instead are to be found analogous structures in the form of combs built up of glandular trichomes, of which there are four on the under side of the trap running up toward and ending at the entrance. Above the entrance there is a heavy overhang or rostrum bearing a number of similar combs radiating toward the entrance. The whole armature above and below the entrance constitute guides leading to the door, or at all events, they might be so regarded. The component trichomes are of the type generally present, and consist of a basal, middle and capital cell. Often the basal cell is secondarily subdivided. This armature viewed in its entirety and suitably magnified presents a rather horrific aspect, suggesting a many armed sort of devil fish. If we make a median longitudinal section we get the appearance seen in figure 4. On first inspection it appears similar to that of *U. gibba.* There is the door and threshold, but one sees further that the door has a different shape, as also the threshold. At once one notices the absence of the tripping bristles and the difference in the character of the armature of hairs. These occur in a rather dense group in the middle of the upper portion of the door. Just at the limit between the upper and lower parts of the door there is to be seen a single curiously shaped trichome which reminds one of a Malay kriss, so I have dubbed it the kriss trichome. There is only one such trichome on the door and it is always placed as represented in the diagram. The basal cell is attached to the middle point of the door and has the shape of a swan's neck. The middle cell is oblique and the capital cell has the shape of a kriss blade, the whole being again of the general type of glandular cell characteristic of the genus. Its position is such that the free end lies under the lower half of the door and must cause a slight flexure of the door edge as it lies against the threshold.

The two halves of the door are of different structure. The upper half is flexible and convex outwardly. As in other species it is composed of two courses of cells, but these are of nearly equal thickness, whereas in *U. gibba, vulgaris,* etc., the outer course is quite thin, and the inner deep, the free walls bulging considerably in the position of equilibrium. This difference must result in a slight difference of resistance to pressure, so that in *capensis* the bulging upper part of the door can be easily bent in by pressure if applied locally, while the pressure of water applied equally does not do so. In this respect *capensis* is similar to several other species I have examined. The lower half of the door consists of a broad thick weal, the outer walls of both courses of cells being much thickened. These relations can best be seen in fig. 5, in which I have represented the door as raised up above the threshold in the measure indicated by the stopped line, without distorting its form with relation to the threshold. By comparing with fig. 4 the true position can be seen, as nearly true at all events as I can represent it.

There is still another feature of the door which distinguishes it from that of *U. gibba,* namely, its shape when considered in relation to its attachment to the walls of the trap. In *gibba* its form is that of a quarter of a spherical surface. In *capensis* it is rather narrowly triangular and could be fitted to about one-eighth of a sphere. The curvature of the free edge is accordingly much less, and this coupled with the relatively great strength of the weal enables the lower half of the door when in equilibrium to press downwardly very firmly on the threshold. This gives the weal a downward thrust as indicated by the arrow point 1. The water pressure causes a thrust in the direction of the lower arrow point 2, and so by resolution of forces it is seen that the resultant thrust is downwards and inwards with respect to the interior of the trap. This thrust is received by the outwardly facing inner edge of the threshold, in a different position therefore than in *U. gibba.* It is necessary for my view of the way in which the mechanism works that there should be such a thrust as above described. It is only thus that the door can be

released suddenly, as I assured myself is the case by studying living material while at Capetown.

The threshold is broad and massive. The outer surface is armed by rows of glandular hairs and graduated in size from within outwardly. The tops of these hairs thus lie in a lightly curved plane which carries through the pavement epithelium. This is broad, the outer zone of cells bearing bladdery extensions of their cuticles, with the attached exfoliated cuticular membrane. The third innermost zone serves to accept the thrust of the door edge and accordingly, as a result of the curvature of the pavement epithelium, faces outwardly.

When the door mechanism is in the set position the tops of the glandular hairs arising from the outer surface of the threshold block approach in such a manner that a small animal must, if it persists in bothering itself about it at all, at last push against the glandular hairs covering the convex upper part of the door. A very slight pressure bends this inwardly and the curvature is then transmitted to the lower part of the door which, it will be recalled is already slightly flexed in favour of such bending. This is sufficient to release the door edge by raising it a trifle above the *ligne d'appui* when the water pressure does the rest. The position of the door during its momentarily open position is indicated by the dotted line in fig. 4, the line of attachment of the hinge to the walls being indicated by the broken line. By comparing this diagram with that of figs. 1 and 2 it will be seen that the swing of the door is less ample than in *U. gibba*. This is due to the narrow shape of the door as already described. There is accordingly less transverse curvature when the door is in the position of equilibrium.

Only one other species of those which have come under my observation agrees with *capensis* in point of structure, namely my No. 4 collected at Victoria Falls and on the Chibipopo, kindly determined by Dr. A. B. Rendle as *U. Welwitschii*. The traps of this species have a very simple armature of trichomes radiating from the rostrum. In point of structure, the door mechanism is almost identical with that of *U. capensis*.

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Lachenalia.

By WINSOME F. BARKER.

AMID the wealth of South African bulbous plants *Lachenalia* lends itself particularly to cultivation in gardens. The flowers range through all the varying shades of red, green, blue, purple, and yellow, and make brilliant patches of colour; and very often a delightful orchid-like or peculiar spicy scent reminiscent of carnations combines with their brilliance in making them attractive. They make charming pot-plants, and several grown together, like hyacinths, will remain beautiful for two or three weeks in the house. If they are cut for vases, it is well to remember to put not more than an inch depth of water in the vase, and to cut the end off the stalk from time to time as it becomes soft. This ensures their lasting till every bud developes; for there is an immense vitality in the peduncle of a *Lachenalia*.

The bulbs increase very rapidly by the formation of bulbils at the base of the bulb, and already plants have been grown commercially with success in the Transvaal and Natal. Unlike so many of our bulbs, whose flowering-period is all too short, *Lachenalia*, with one or more

species at a time and in different localities, blooms for no less than nine months in the year. April opens the season with *L. rubida* on the dunes in the Cape Peninsula, followed closely by the early-flowering form of *L. pendula* which grows at Riversdale, our local form being due about July. From August (with *L. tricolor*) to October the great majority are in bloom, the number gradually diminishing during the latter month. Then in November, from five thousand feet or more on the Oudeberg and Sneeuwberg in the Graaff-Reinet and Richmond Divisions, one of the daintiest in the genus, *L. rhodantha*, comes to us, as if from the clouds, and lasts till December, when *L. Muirii*, from near Still Bay in the Riversdale Division, brings the reign of *Lachenalia* to an end.

At present the genus is most widely known by its large pendulous-flowered forms; and *L. pendula*, the largest of them all, with red and green flowers, *L. tricolor*, green, yellow and red-purple, and its very close ally *L. aurea*, whose golden trumpets are usually timed to blow a little later than those of *L. tricolor*, are the most popular for potting and bedding.

As early as 1774 *Lachenalia* attracted the attention of European botanists, when Masson introduced *L. pendula* and *L. contaminata* to Kew, where they were classified under the generic names of *Phormium* and *Hyacinthus*. It was not until 1787 that Jacquin figured and described *Lachenalia tricolor*, in his "Nova Acta Helvetica," naming the genus after Werner de Lachenal, a Swiss professor of botany, who was educated at Basle and died in 1800. (It may be noted by the way that in this name the "ch" is soft, and that in anglicising the pronunciation to "Lackenalia" we have obscured the derivation.) During the years 1786-1793 Jacquin continued his work on *Lachenalia*, and published in that fine Austrian work, "Icones Plantarum Rariorum" as many as twenty-one admirable plates illustrating the genus. About a hundred years later, when Baker's account in the "Flora Capensis" appeared, the number of species largely representing the collection of Thunberg, Masson, Ecklon and Zeyher, Pappe, McOwan, and Bolus, had risen to forty-two. Unfortunately some of the species were described from plants which flowered in Europe and these were not dried for herbarium-specimens; while in the case of Masson's plants no dried specimens exist either, the descriptions having been made from his drawings in the British Museum, so that our knowledge of them is somewhat limited.

In the thirty years following the publication of Baker's monograph various authors have been occupied with the genus, and twelve additional species have been discovered and described (namely, *L. brevipes*, Bak., *L. algoensis*, Schönl., *L. dasybotrya*, Diels, *L. splendida*, Diels, *L. klinghardtiana*, Dinter, *L. convallariodora*, Stapf, *L. Roodiae*, Phillips, *L. ovatifolia*, L. Guthrie, *L. Muirii*, Barker, and *L. Comptonii*, Barker). These would have brought the total to fifty-four species if it were not that one of Jacquin's species, *L. pusilla*, has been removed to the genus *Polyxena*. With several new species which are to be described soon in the "Flowering Plants of South Africa" with coloured plates, we estimate the number of known species to be about sixty.

Lachenalia is an entirely South African genus, its nearest ally being *Polyxena*, another endemic genus. The latter has its perianth-segments equal, the former always at least slightly unequal, and its flowers exhibit a great variety in shape and size. Comparatively few of the species have long pendulous flowers, such as those of *L. pendula*, which are remarkably like the flowers of *Aloe ciliaris*. In other species, as for instance *L. latifolia*, one is reminded more of *Hyacinthus*.

As an example of the genus we may take *L. undulata*, Masson (see Plate II, A), a species which has had rather an interesting history. It was discovered and drawn by Masson and described by Baker from the drawing, but the plant was rediscovered in 1928 by Mr. P. Ross Frames, about twenty miles north of Van Rhynsdorp; and in 1930 we learnt it was plentiful near Nieuwoudtville. The species is among the small ones in the genus, both in height and in the size of the flowers and bulb. The two leaves (one or two leaves are the general rule throughout the genus) clasp the base of the peduncle, the lanceolate spreading blade having its margin undulate or waved. The lower part of the peduncle (as is universal in the genus) is bare, but the spicately arranged flowers are subtended by amplexicaul bracts, which become narrower as they near the apex, those subtending the small sterile flowers at the apex being lanceolate. The perianth (as is typical of the genus) is persistent, the segments joined at the base and forming a short tube, the three outer being oblong and slightly gibbous at the apex, while the inner are larger, obtuse, spathulate, and spreading at the apex. As in a great many other species, the flower is zygomorphic, the two upper segments spreading away from the lower (A, 1-2) which is narrower, and has its edges slightly incurved. The stamens are declinate, their filaments slender and attached to the perianth-tube, and the anthers versatile and dehiscing introrsely. The ovary is small, ovoid and green,

the style slender and declinate, and the stigma minutely capitate.

Although the leaves in *Lachenalia* usually occur in pairs, there are several species, such as *L. anguinea* (B), *L. unifolia*, and *L. hirta* in which the leaf is single; and in *L. contaminata* (F.) and *L. orthopetala* they may be as many as eight. The shape of the leaf may vary from the slender thread-like form of *L. rhodantha* to the broad ovate leaves of *L. latifolia*. The surface of the clasping base is sometimes conspicuously marked with bands, as in *L. anguinea* (B.) and *L. hirta;* or tinged or blotched with very dark green; or more often the upper side of the leaf is distinctly spotted with blackish purple, or pustulate; and occasionally, as in *L. hirta*, *L. Comptonii*, and *L. trichophylla*, the margin and surface are furnished with stiff hairs.

There are three main types of inflorescence in the genus, namely, the spike, where the flowers are sessile, as in *L. undulata* (A.), and more or less erect in this species or cernuous as in *L. mutabilis* (I.); the raceme, where the flowers are conspicuously pedicellate and nearly always pendulous, as in *L. anguinea* (B.); and finally the subspicate type of inflorescence, where the pedicel is very short, as in *L. orthopetala* (C), with erect flowers, and *L. contaminata* (F.) and *L. Comptonii* (D.), both with spreading flowers.

In size the flowers of *Lachenalia* range from 4 cm. to 4 mm. (or $1\frac{3}{5}$—$\frac{1}{6}$ ins.) long. There is usually a marked difference in the relative length of the inner and outer segments, notably in *L. tricolor* (J.) where the former are twice as long as the latter. At the other end of the series we have *L. contaminata* (F.) and *L. Comptonii* (D.), with the segments almost equal and all of the same colour, and *L. pendula* (K.) where the inner and outer segments contrast in colour. As a rule in the genus the outer segments are more brightly coloured than the inner.

Another interesting variation is in the length of the stamens. Those of the spicate and long pendulous flowers are as long as the inner perianth-segments or very slightly longer; and those of the subspicate group are either slightly, or, like most of those in the racemose group, very much exserted from the perianth. The style usually equals the stamens in length until the anthers have dehisced, when it lengthens a little beyond them.

The fruit is a loculicidal capsule (L.), membranous, ovoid in general outline, and more or less triquetrous. As the capsule splits the seeds fall to the ground and are then said to be dispersed by ants. For each seed is furnished with an oily appendage, known botanically as an *elaiosome*, and the ants in their endeavour to secure this desirable nutriment have perforce to take the whole seed along. I have not been able to determine what exactly happens, since the ants I observed at Kirstenbosch were the small Argentine ones, and although they appeared to be trying to carry off the seed, this was not actually effected.

Among the visitors to the flowers we saw large numbers of bees and butterflies, seeking the nectar at the base of the perianth-tube. In this process they inevitably came into contact with the anthers and stigma, and thus ensured cross-pollination.

Many of the *Lachenaliae* are sand-lovers, such as *L. rubida*, and *L. pendula*, found in white sea-sand near the beaches of the Cape Peninsula, and *L. unicolor* along the sandy banks of rivers in the Calvinia Division. Others prefer a light loamy soil, like *L. glaucina* which grows under the silver trees at Kirstenbosch. The small yellow *Lachenalia* from Malmesbury, probably a new species, is said to grow in marshy places, and *L. trichophylla* goes to the other extreme in choosing the karroid areas of Calvinia.

EXPLANATION OF PLATE.

A. LACHENALIA UNDULATA, Masson. *Ross-Frames*, Van Rhynsdorp.
   1. Flower.
   2. Front view of flower.
   3. Section of flower.
   4. Lateral inner perianth segment.
   5. Uppermost outer perianth segment.
   6. Lowermost inner perianth segment and stamen attached.

B. LACHENALIA ANGUINEA, Sweet. *Compton*, Whitehill.

C. LACHENALIA ORTHOPETALA, Jacq. $\frac{1899}{26}$ *Ross-Frames*, Malmesbury.
   1. Side view of flower.

D. LACHENALIA COMPTONII, Barker. *Compton* 3533, Whitehill. Flower side view and front view.

E. LACHENALIA BACHMANNI, Baker. $\frac{2798}{27}$ *Van Zyl*, Piquetberg. Flower side view and front view.

F. LACHENALIA CONTAMINATA, Ait. $\frac{1511}{28}$ *Mathews*, Genadendal. Flower side view and front view.

G. LACHENALIA GLAUCINA, Jacq. var. PALLIDA, Lindl. *Stanford*, Stellenbosch. Section and front view of flower.

H. LACHENALIA UNICOLOR, Jacq. var. FRAGRANS. Jacq. $\frac{1126}{23}$ *Mathews*. Mitchell's Pass. Flower side view and front view.

I. LACHENALIA MUTABILIS, Sweet. *Ross-Frames*. Citrusdal. Section and front view of flower.

J. LACHENALIA TRICOLOR, Thunb. var. QUADRICOLOR, Jacq. $\frac{624}{xx}$ *Arbuthnot*.

K. LACHENALIA PENDULA, Ait. *Weintroub*. Ronde Vlei, Muizenberg.

L. Capsule and seeds.

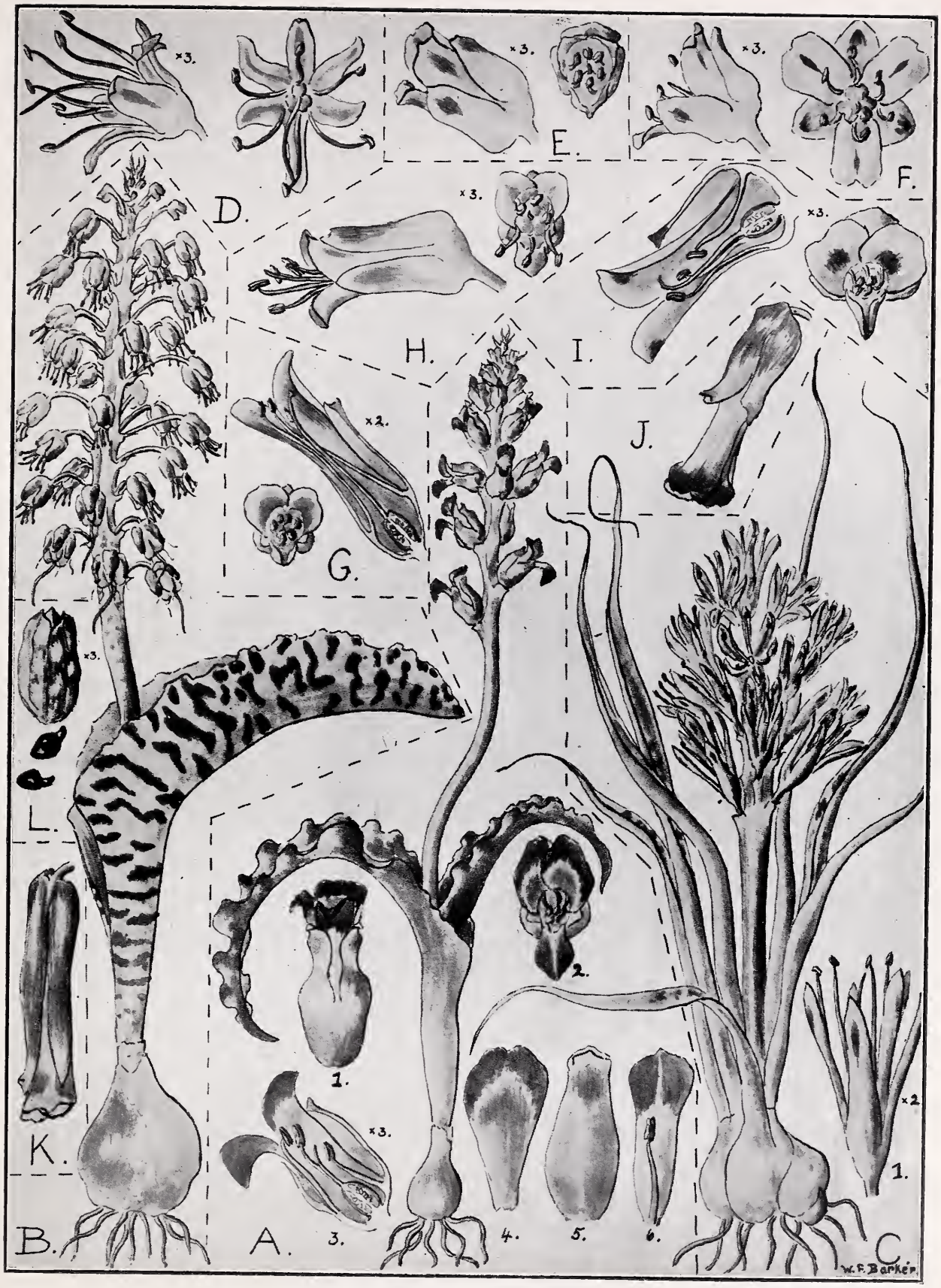


PLATE II.—Lachenalia.

Del.: W. F. Barker.

The National Botanic Gardens possesses a fine living collection of *Lachenalia*, consisting of about thirty-five species. With our knowledge gained from the Kirstenbosch records, together with the localities quoted in the "Flora Capensis" and the sheets in the Bolus Herbarium, we find that most of the species are to be found in the south-western region of the Cape Province. For instance, there are eleven species on the Cape Peninsula; but we may also note that in a comparatively small area round Nieuwoudtville we found no less than seven species flowering over a period of about three weeks. The genus is also well represented in the western region as far north as the Orange River, and one species, *L. klinghardtiana* occurs in Great Namaqualand. From the Karroo at Whitehill we have *L. anguinea* and *L. Comptonii;* on the mountains in the Graaff-Reinet, Richmond, and Queenstown Divisions *L. rhodantha* is the sole representative; and the ubiquitous *L. pustulata* extends from Calvinia southwards to the Cape Peninsula, and eastwards to the Uitenhage Division. The two species peculiar to the south-eastern region are *L. algoensis*, near Port Elizabeth, and *L. convallarioides* from Albany and the Transkei.

Kirstenbosch,

November, 1930.

The Cultivation of Lachenalias

By J. W. MATHEWS.

THE value of Lachenalias in the greenhouses of Europe has been recognised for generations, especially *L. tricolor*, *L. aurea* and to a less extent *L. pendula*. At various times hybridists have taken them in hand and have obtained a few outstanding hybrids, but there does not appear to have been that general appreciation their horticultural merits deserve. *L. tricolor*, in its strongest variety, has been continually in cultivation through the last century, and is a favourite to-day for hanging-baskets and pot culture.

The best species have been described as the "Cape Hyacinths," and certainly when stocks are available in sufficient numbers they will be exceedingly effective at the Cape as early spring flowering bulbs. As a genus they are perhaps the most distinct and beautiful of dwarf bulbs for such a purpose, and in their entirety will form an interesting class for the specialist-cultivator or hybridist. As flowering bulbs the strongest species are effective and lasting in colour, and distinct in form, being in reality miniature spikes of Aloe blooms. For pot cultivation for house decoration, or tins on the stoep, we have quite a few appreciative growers.

In the Flora Capensis 42 species are described, and of the material trickling into the garden there are perhaps 3 or 10 that may rank as new species. Numerous colour forms are to be found in the more robust species, i.e , *L. tricolor*, *L. pendula*, *L. orchioides*, *L. unifolia*, *L. unicolor*, *and L. glaucina*, which would form the best nucleus for a grower to start with for any purpose.

The majority of the species are found in the coast region of winter rains, with *L. rhodantha* from Graaff-Reinet, *L. campanulata* from the Somerset Division, and *L. convallarioides* from the Transkei, as outliers. These three would doubtless thrive best as summer subjects in the Peninsula.

The Lachenalia season, ordinarily, starts in June with *L. rubida*, followed quickly by *L. pusilla*, *L. pendula*, and *L. reflexa*, with *L. tricolor*, *L. orchioides*, *L. aurea*, *L. pustulata* to the end of August, and *L. unifolia*, *L. liliiflora*, *L. glaucina*, etc., in September. The Clanwilliam and Little Namaqualand species, *L. purpureo-coerulea* etc., in September and October. These last have the distressing habit to the cultivator of the leaves drying up by the time they are in full flower.

Soil and conditions of the habitats of the various species differ somewhat as may be expected. *L. pendula*, and *L. rubida* are confined mainly to the sand flats, or like *L. tricolor* and its varieties to humus and sand between large boulders giving partial shade. The majority are found in loose sandy loams with various proportions of humus. A few only are found in saturated or inundated soils, like *L. orchioides*, *L. pustulata*, and the new species from Vredenburg which thrives only with an abundance of moisture.

Under cultivation a good well drained garden soil with plenty of water during growth will secure satisfactory results with most species. In pots or tins the soil should approximate 2 parts red soil, 1 part each leaf mould, and dry cow manure broken fine, and sufficient coarse sand to make the whole porous. In potting the top of the bulb

should not be more than an inch below the surface; in planting out not more than two inches for the strong growers, and proportionately less for the weaker or smaller ones. All should be planted out by the end of March, but in pot work where sufficient stock is available they may be divided into succession batches. Space 7 bulbs to a 5-inch pot, and in nursery beds 3 inches apart with 6 inches between the rows. For massed effect in flower beds space 4 inches each way, and with a groundwork of such a plant as *Felicia Bergerianus* space 6 or 7 inches apart according to size of bulbs. Where possible allow the plants to dry off before lifting, after which they can be stored thinly in a cool dry shed. Should they have to be lifted before growth is dry lay them in moist soil to gradually dry off.

Increase of stock is quickly obtained by bulblets from *L. tricolor*, and less so from *L. aurea* and *L. pendula*. All the others can be increased quickly only from seed, which is however produced very freely. Whether raised in tins or beds Lachenalia seeds require a rich light soil, and somewhat thin sowing as they should remain for two seasons in their seed quarters. A few species flower well the second season, and all in their third. It is however necessary to lift them all after the second season's growth, and plant out with more space. Sow very shallow, and cover lightly with sand or a light, sandy soil. Where beds have been standing dry it is essential they should be thoroughly soaked prior to preparation for the seed. Keep constantly moist when growth starts, and continue to water so long as growth is being made. The period between seed and flowering can be appreciably shortened by careful attention to watering in order to extend the growing period as much as possible each season.

The majority of Lachenalias respond freely to good treatment provided always the drainage is perfect. A rich light soil with plenty of water during vegetative growth will secure the greatest satisfaction. Never defer watering when it is required, the cultivator should have a good season every season, not only when it is a good season on the veld.

Kirstenbosch, 1930.

The Rhenoster Bush.

By MARGARET R. LEVYNS.

FREQUENT references to the many beautiful flowers of South Africa are apt to make one forget those that are neither beautiful nor useful. Among such plants the Rhenoster bush occupies a notorious position, and although at first sight it appears that such a drab looking plant must be totally devoid of interest from any standpoint, yet on a closer acquaintance it reveals itself as a plant of character and one worth more than a cursory and contemptuous glance.

The plant itself is a grey-green shrub from two to four feet in height. In parts of the country, especially those where fine grained soils predominate, it occupies large tracts of country to the exclusion of most other plants. The result is a monotonous type of vegetation. Most of the early travellers in South Africa mention the dullness of the country dominated by the Rhenoster bush. As long ago as 1775 Sparrman referred to the bush in terms which show clearly that he regarded it as an aggressive plant, one not a natural inhabitant of many of the places in which he found it growing. He tells a story of how he asked the farmers in the Riversdale district to what they attributed the spread of this pest, and was told that it was a punishment for their sins. With characteristic shrewdness Sparrman remarks that their sins seem to him to be mismanagement of the veld by the farmers themselves. Since that time many theories have been advanced to try and explain the aggressive habits of this plant. Such aggressiveness is often associated with aliens which succeed in establishing themselves in new lands in which climatic conditions are suitable. The most persistent of the theories with regard to the Rhenoster bush is the one which assumes an origin for the plant somewhere in the East Indies from which place it was presumed to have been introduced in the days of the East India Company as packing for empty wine casks. Unfortunately for such a picturesque theory, the Rhenoster bush has never been found outside South Africa and as all its close relatives grow here the theory has no scientific support.

From the botanical point of view it is probable that at least three distinct species are at present included in the

one species *Elytropappus Rhinocerotis*. However, until investigations on the subject are completed, the name Rhenoster bush will serve to cover all the forms. The following account of the life of the plant is based on a detailed study of its behaviour under varying conditions.

The plant which in the adult condition has small, adpressed grey-green leaves, comes into flower about the end of April but far from having a beautifying effect the flowers, and later on the fruits, only succeed in making the plant look browner and more dingy than ever. The flowers like those of most composites are borne in heads. In this case the heads are extremely small and have only three florets in each. However, the number of heads on each plant is enormous. In one case a twig about three inches in length was examined in the fruiting stage and was found to produce over three hundred fruits. As an average plant has several hundreds of similar twigs, some estimate of the output may be gauged. All the fruits are potentially fertile but only about half produce good seed. The fruits, which are provided with a feathery pappus, are shed in June and July and externally appear to be quite ripe and ready for germination. However, numerous tests have shown that at this stage only a very small proportion — about one or two per cent. — are ready to germinate. Under ordinary conditions a year's rest suffices to bring about a much higher germinating capacity, so that the seeds of the Rhenoster bush, like those of many other South African plants, require at least a year's rest before germination. Experiments show that the Rhenoster seed retains its power of vigorous germination for about four years.

Some interesting results are indicated by tests made during the present year. Prior to 1929 all seed used in these experiments was stored in the botanical laboratory in Cape Town where a great daily range in temperature was experienced especially during the summer months. In the summer of 1929-1930 the seed was stored in one of the new laboratories at Groote Schuur where the daily range of temperature is considerably lower. The result has been a considerable decrease in the number of germinations in the tests for this year. If it can be proved that fairly uniform temperatures during the resting period affect the seed adversely, or that a high temperature is necessary, then the results of these tests will have an important practical application in connection with the treatment of South African seeds during their resting periods.

The adult plant is usually regarded as having a high capacity for drought resistance, due probably to its possession of an extremely long tap root which penetrates below the dry surface layers of the soil. The seedling on the other hand, is unusually susceptible to drought and if grown in a pot will not survive if deprived of water even for a few hours. Another peculiarity is its marked intolerance of shade, even the light shade afforded by the parent Rhenoster bush itself being sufficient to kill out any seedlings which may have started growth. The seedling in fact is as fastidious in its tastes as the most pampered hothouse plant. These peculiarities of the seedling hardly suggest the pest that all farmers know the Rhenoster to be. In fact the light demanding habit of the seedling shows clearly that this bush has no power of establishing itself in places where the veld is left untouched. Where man steps in and modifies the natural conditions by burning or over-grazing his veld, then the Rhenoster bush gets its chance of starting on a new lease of life. The rapid spread of the Rhenoster bush in historical times is clearly the outcome of man's abuse of the veld.

Veld-burning is practised extensively in those parts of the country where the Rhenoster bush predominates. Experiments conducted at Stellenbosch have shown that burning, far from clearing the ground of Rhenoster bush, only aggravates the evil, for while on untouched veld seedlings do not grow, on burnt veld they come up in their hundreds. The stimulus provided here is definitely due to burning. On veld which has been cleared of bush only scattered seedlings appear, their numbers being in no way comparable with those in burnt areas.

Much has been said and written in disparagement of the Rhenoster bush and one must confess that apart from its scientific interest it is difficult to find anything of a complimentary nature to say about it. Perhaps its only virtue at present is its capacity for burning vigorously under almost any conditions, an attribute which recommends it to campers anxious to start a fire easily. The recent discovery by Professor van der Riet of Stellenbosch that the plant secretes enormous quantities of wax, may at some future date be put to a practical use, in which case the Rhenoster bush will cease to be regarded as a pest and will be cultivated for its intrinsic worth.

University of Cape Town,
November, 1930.

Orothamnus Zeyheri.

By R. A. H. Flugge-de Smidt.

IN "The Flowering Plants of South Africa" the Orothamnus is described as a *rara avis* of South African flora.

A great many people have seen specimens during the last few years at the Caledon and other Flower Shows but very few people have ever seen the Orothamnus growing in its native habitat.

The secret of its haunts is jealously guarded, and rightly so, therefore it was a great privilege to have been allowed to photograph the living plants.

There are perhaps not more than 3 or 4 small and isolated areas where the Orothamnus is still found. A coloured flower picker was to be our guide to a place where, he told us, the "marsh rose" grew as large as apple trees.

We left our base camp at the foot of the Hottentot Holland Mountains before daybreak one morning and after 5½ hours marching and climbing reached our objective. Grand as was the sight of these wonderful red "roses" glistening in the sunlight we were nevertheless disappointed in the size of the trees. There were a number of dead trunks, some of which can be seen in Figure No. 1, of what had been large trees but the live ones were considerably smaller. The guide averred the trees must have died because they were too old!

After the photographs were completed the guide, who had a permit, proceeded to cut specimens for the Caledon Show.

Figure No. 2 is eloquent of what happens. In many cases the only leaves are near the flowers and when these are cut no leaves are left on the stalk. The tree on the left had 3 branches. The knife cuts of the year before on two of them are clearly visible. The third branch probably did not support a sufficiently good specimen so it was spared and the tree still lived.

The guide had orders for 12 specimens, 3 each for 4 exhibitors and because they were not numerous the tree on the right in Figure No. 2 was stripped of all its flowers leaving not a single leaf. That tree must die, because it has not the power to send out new shoots.

T. P. Stokoe, my companion on this excursion, is of the opinion that when the first blossom of a young Orothamnus is cut it also dies even when leaves are left on the stalk.

Exhibitors who pay coloured flower pickers to collect their specimens are unaware of the irretrievable damage caused.

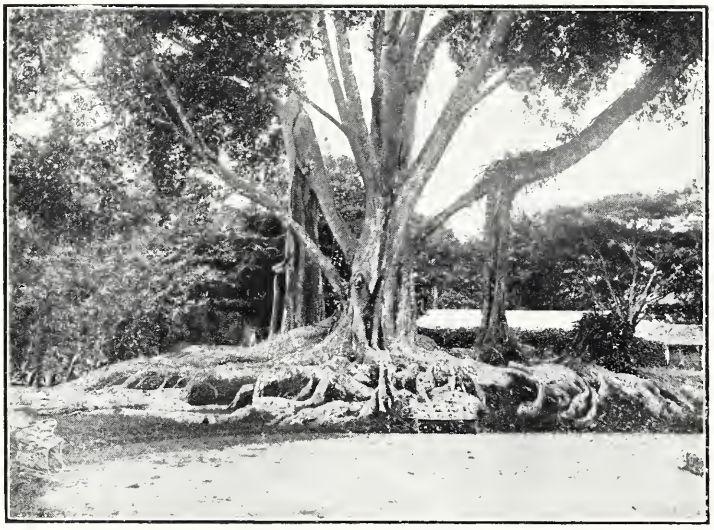
Mountain fires have nearly exterminated the Orothamnus. Flower shows are delivering the *coup de grâce*.

November, 1930.

Botanic Gardens in the East.

By R. H. Compton.

AMONG the world's great botanic gardens there are two which are specially associated with tropical conditions, Peradeniya in Ceylon, and Buitenzorg in Java. They both originated and developed in response to the scientific interest of the rich and novel tropical floras in which the colonists found themselves and to the necessity for their study and cultivation from the economic point of view. Both gardens were an essential part of colonial development, and during their century of life Peradeniya has contributed greatly to the prosperity of Ceylon and of the neighbouring British possessions, and Buitenzorg has done the same for the Dutch East Indies. Moreover, both of them have the credit for many notable advances in the study of tropical plant life of more than local significance, and the names of Trimen and Willis of Peradeniya and Treub of Buitenzorg have an international reputation in the botanical world.



1 and 2. Orothamnus Zeyheri.

PLATE III.

3. Victoria regia on Buitenzorg Lake.
4. Ficus religiosa at Peradeniya.

Not only have these gardens an economic and a scientific importance, but they have achieved fame as places of extraordinary beauty and interest to the layman. On arriving in Ceylon one is told that the three things best worth seeing are Nuwara Eliya the hill-station, Anaradhapura for its vast old Buddhist ruins, and Peradeniya. And, curiously enough, the three "sights" of Java are Bandoeng the modern hill-city, the ancient Borobudur Buddhist monument, and Buitenzorg.

Any botanic garden has three principal aspects, scientific, economic and popular; and in the history of Peradeniya the viscissitudes of time and management have resulted in many changes of policy. At present the Agricultural Department is in control at Peradeniya, and there is actually no Director of the Gardens themselves. The Curator is responsible to the Director of Agriculture, and any scientific work done in or for the Gardens — e g., work in the herbarium or museum — is done under the aegis of the Agricultural Department. The Gardens are regarded, in fact, as subsidiary to the agricultural interests of the Government; in these circumstances scientific work has naturally an economic trend, and the Gardens themselves become regarded largely as a park and a place of popular resort. The purely scientific aim tends to be lost sight of.

This was not always so. Prior to 1912 Peradeniya was an autonomous institution, and under the directorship of Thwaites, Trimen and Willis the Gardens developed on scientific lines in co-ordination with herbarium, laboratory and museum, and results of great botanical importance were achieved. In 1912, however, Dr. Willis resigned, and the Agricultural Department took control, so that in some respects Peradeniya is shorn of its past glory.

Buitenzorg has had a somewhat different history, in which the most prominent figure is that of Melchior Treub one of the great names of Java as well as of botanical science. Treub made Buitenzorg a great institution first, and then founded the Agricultural Department on the basis of the Gardens. Treub himself became the first Director of Agriculture. Naturally, therefore, the Gardens, both in Treub's lifetime and subsequently, were regarded as the fundamental scientific basis for the agricultural work of the Government; and though the work has ramified in many directions since Treub's time. the Gardens continue to occupy a place of honour as a centre for scientific research. All the Government laboratories, forestry institute, testing station and museums under the Agricultural Department have grown up round the Gardens, although Buitenzorg itself is a very small town, 30 miles away from Batavia.

Buitenzorg Gardens struck me as the most strictly botanical gardens that I have ever seen. They are pleasantly laid out, there is a beautiful lake covered with white and pink water-lilies and haunted by waterfowl, and there is a certain amount of turf. But there is no display for display's sake. Ornamental bedding, blazes of colour, massed effects and so on are absent. Everywhere one feels that the botanical aim is paramount; the aesthetic beauty which Buitenzorg achieves and which delights the senses of all visitors is secondary and, as it were, a by-product of its main scientific activity. For instance, there is a large grove of huge Angiopteris ferns with fronds twelve feet long; but its purpose is to give shade to the collection of Bromeliaceae. Tree-ferns are grown en masse, not to make a display, but to afford a home for epiphytic ferns and lycopods. A large plantation of the exquisite frangipani proves on inspection to be really the host-plants for epiphytic orchids. of which some thousand species are grown. Even the celebrated Canarium Avenue, the chief " feature " of the Gardens, chiefly provides supports for a marvellous collection of climbing aroids which densely clothe trunks and branches with their huge leaves.

The rule at Buitenzorg is to plant two to four specimens of each species. This is a plan well suited to large trees and lianes, which form the principal elements of moist tropical vegetation and which have a long life; it is not suitable for the annuals, herbaceous plants and short-lived shrubs which occur in more temperate climes such as the Cape. Every plant is carefully registered, indexed with cross references, labelled and entered on the planting plan; so that it is possible to locate any particular plant and learn all its history in a few moments without relying on the memory of individuals. Naturally, this involves a clerical staff; there are, for instance, three employees kept entirely occupied on writing new garden labels and renewing old ones. There is also a garden herbarium in which are preserved flowering specimens of every plant growing in the Gardens.

Peradeniya is laid out in a more spacious style and definitely sets out to provide a pleasance for the public. There are large areas of lawn and asphalted roads throughout; motor cars are admitted, and a drive round the Gardens is a favourite evening trip for motorists from Kandy. This naturally does not conduce to peace or botanical study! There are ornamental banks of foliage plants, pergolas and arches, flower beds and ribbon borders. The

Gardens are certainly stately, and provide a display of colour; and one may be permitted to praise this while one reserves one's fuller admiration for the less studious beauties of Buitenzorg.

Peradeniya occupies a site of much beauty, lying in a great loop of the largest river in Ceylon, on whose banks grow graceful clumps of the yellow bamboo. The ground itself is gently undulating, and there is not the scenic background which we have at Kirstenbosch. The "features" are rather artificial, but so magnificient are the trees and lianes that no accentuation of their beauties is possible. The Great Circle is a broad circular drive around a slight depression, with greensward and scattered trees rising on all sides, producing a noble park-like effect.

The trees are drawn from all countries and it was interesting to see how well the African Spathodea, or "flame of the forest," succeeds; this gorgeous tree is a great favourite all through Ceylon, the Straits and the East Indies. Peradeniya was one of the first places to grow *Amherstia nobilis*, surely one of the most glorious flowering trees in existence, with long pendent clusters of large vermilion orchid-like flowers. There are gigantic kaoris, with trunks like Norman columns, splendid mahoganies, and a collection of palms numbering about 90 genera which is an eye-opener to anyone who knows palms chiefly in pots and greenhouses.

Buitenzorg also has a river, but this is confined within stone banks, and is a less imposing affair than the great turbid stream that encircles Peradeniya. The soil at Buitenzorg is of volcanic origin, mostly very deep and rich and growth is astonishingly rapid, so that the plants exhibit an even greater luxuriance than at Peradeniya. Specially interesting is the *Victoria regia*, or giant water-lily of the Amazon, which produces its enormous saucer-like leaves five or six feet across, and its pink or white flowers the size of a cabbage throughout the year.

At Buitenzorg I saw a flowering specimen of the Talipot palm; this is the largest of all palms; it only flowers once, at the age of about 55 years, after which it dies. The famous Talipot Avenue at Peradeniya flowered and perished in this way a few years ago.

A very interesting experiment is the cultivation of mangroves; several species of these salt-marsh trees are being grown quite successfully in fresh-water swamp conditions, producing the well-known aerating roots and scattering their seedlings in normal fashion. The trees are loaded with epiphytic ferns, orchids with branches six feet long, and innumerable other plants of beauty and interest.

I was able to see the young flower buds of a Rafflesia, the celebrated parasite, one species of which has a flower six feet in diameter, now being grown in cultivation for the first time. A recital of all the interesting things seen at Buitenzorg would be a prolonged affair.

The most striking impression in both of these great tropical gardens is made by the trees. To one accustomed to the slow-growing trees of South Africa, the spectacle of trees reaching 150 feet in height with enormous sturdy trunks in the course of 50 or 60 years is almost incredible. Yet this is not exceptional in tropical rain-forest trees, which grow almost continuously throughout the year. Some species make even faster growth than this; there is an Albizzia (a close relative of our well-known weedy stinkboontje), which reaches a height of 60 feet in six years, with a wide-spreading crown. The appearance of the arboretums at Peradeniya and Buitenzorg is wonderfully impressive and stately, the enormous trunks rising sheer from the ground, often to a height of 70 or 80 feet before branching. The bases of the trunks are often furnished with broad flat "plank buttresses" radiating on all sides, this feature occurring in a large number of species; I saw it well developed, for instance, in a species of oak, *Quercus platycarpa*.

The lianes, or climbers, are equally marvellous. Some of them form a dense mantle of green covering whole groups of trees and hanging from their highest branches. The aroids climb up tree-trunks with great rapidity, and then proceed to let down long rope-like trailers from a height of perhaps a hundred feet; these eventually reach the ground, when they root and creep along the surface until they reach another trunk, when they repeat the process.

The prevailing aspect of the gardens, as of tropical vegetation generally, is of a luxuriant greenery. Colour is relatively scarce, and is more often produced by young foliage than by flowers. There is nothing to compare with the dazzling display of colour at Kirstenbosch in the spring Flowering shrubs are scarce, and annuals almost non-existent. The trees mostly flower at the crowns only, so that one only realises the fact by seeing fallen petals on the ground. It is typical of local human nature to prefer Celosias and Alternantheras to the really amazing trees and lianes which the moist tropics produce in such profusion. But to me, a visitor, the trees were miraculous; a single one of them transferred bodily to the Cape would attract worshippers from all around.

I also visited the very charming mountain garden of Hakgala, in Ceylon, where I was glad to see various familiar South African flowers. A blue Aristea is running wild in the district, and there are also Agapanthus, Moreas. Dieramas and three or four Watsonias planted in the Garden. These plants do not succeed in tropical lowlands, but they find an altitude of 5,000 feet to their liking.

In the Straits Settlements I visited the Waterfall Gardens at Penang, and also the main Gardens at Singapore; and in Japan I visited the Botanic Garden of the Imperial University at Tokyo, as well as two or three other very beautiful non-botanic gardens; but space forbids any description of these.

Naturally, comparisons with Kirstenbosch suggest themselves. Both in Ceylon and Java labour is very cheap, and money goes much further than at the Cape. A labourer at Buitenzorg gets the equivalent of 16s. to 25s. a month without food, and the Gardens can employ about 200 of them. The head gardeners are paid about £5 a month. With advantages of this kind, and considering that both Peradeniya and Buitenzorg are about a century old, it is not surprising if they present a more developed and settled look than does Kirstenbosch. At the same time I have come from these visits very optimistic for the future of Kirstenbosch; money is wanted and patience, but given these requisites, Kirstenbosch will surely rank with Peradeniya and Buitenzorg as one of the great Botanic Gardens of the world.

(With acknowledgements to the "Cape Argus.")

The International Botanical Congress, 1930.

By PROFESSOR R. S. ADAMSON.

THE International Botanical Congress held in Cambridge during the week, August 16-23, 1930, was the fifth of such meetings.

International Botanical meetings are intended to be held at intervals of five years but the sequence has necessarily been upset by the European war. The previous congresses were held in Paris in 1900, in Vienna in 1905, Brussels in 1910, and Ithaca, U.S.A. in 1925.

This, the fifth congress in Cambridge was truly international in character. The meetings were attended by over 1,140 members who represented no fewer than 47 countries, among which South Africa was represented by four botanists.

The congress was under the presidency of Professor A. C. Seward who is well known in South Africa both on account of his work on the fossil plants of the country and still more as he was president of the Botanical Section of the British Association at the meetings held in Cape Town and in Johannesburg in 1929.

Before any account of the work of the congress is attempted a few words may be devoted to the general arangements.

One of the most valuable features of these international meetings is the opportunities that are given for individual botanists to meet and become known to one another. Informal discussions of points of interest in work are very often of greater value and form a greater stimulus to continued effort than any set papers or formal discussions. Such meetings were greatly facilitated by the badges that were worn by the members: these bore in clear letters the name and the country of the wearer.

Before the meetings actually commenced in Cambridge, a reception room was open in the rooms of the Linnean Society at Burlington House, London, where information was supplied, interpreters were available, and badges and programmes were issued.

It cannot be too much emphasised that both here and in Cambridge these secretarial arrangements, as they may be termed, were of the most excellent character. Everything that any of the members could want was catered for and all the arrangements went without a hitch from beginning to end. The whole work of the organisers was as nearly perfect as could reasonably be expected. Even the much maligned British climate was most friendly. While the weather was hardly what could be called "set fair," rain never interfered with the activities and all the open air functions were favoured with fine conditions.

On Friday, August 15th, the members of the congress were entertained to an "At Home" in the Imperial Institute, London, by the British Government. The members were received by the Minister of Agriculture and Mrs. Addison, by the President and Mrs. Seward and by Dr. A.

B. Rendle, the Treasurer. This occasion formed a pleasant preliminary to the more serious work of the congress. Certainly no more suitable setting could have been chosen: the Imperial Institute Museum with its remarkable exhibits of the products and activities of the British Commonwealth of Nations and Colonies, formed a most interesting background.

A special train was arranged for the conveyance of the members from London to Cambridge on Saturday, August 16.

In Cambridge the central reception room and writing room was in the Arts School which also contained the offices of the President, Treasurer, and Secretaries, and a tea-room which formed a popular resort in leisure moments. In the same building was a large hall for the plenary meetings and lectures. The various sections were housed in lecture rooms and laboratories in the immediate vicinity.

The first plenary session was held in the evening of the day of arrival in Cambridge, when the members were welcomed by the President and by the Vice-Chancellor of the University of Cambridge who, in accordance with immemorial custom, welcomed the Congress in a glowing speech in Latin.

Subsequent to this meeting the members of the Congress were entertained by the Master and Fellows of St. John's College at a reception in the college. The actual reception took place in the famous Combination Room which was lit by wax candles. This room can justly be called one of the most beautiful of the many mediaeval glories of the ancient University. On Sunday evening a special organ recital was given for the Congress in the world-famous chapel of King's College.

The more serious work of the Congress commenced on Monday, August 18. The Congress was divided into a number of sections each with its president, vice-presidents, recorder and secretaries. The sections were Bacteriology under the presidency of Professor R. E. Buchanan, Iowa; Phytogeography and Ecology, under Professor H. C. Cowles, Chicago; Genetics and Cytology, under Professor O. Rosenberg, Stockholm; Morphology and Anatomy, under Professor J. C. Schoute, Gröningen; Mycology and Phytopathology, under Professor L. R. Jones, Wisconsin; Plant Physiology, under Dr. F. F. Blackman, Cambridge; Palaeobotany under Dr. D. H. Scott; and Taxonomy and Nomenclature under Professor L. Diels, Berlin. The important subsection on Nomenclature was presided over by Dr. E. D. Merrill. New York.

It is no part of the present account to deal with the papers, communications and discussions of the various sections, nor with the general resolutions adopted by the Congress. These will be incorporated in the official reports which will appear in due course. The majority of the communications to the sections were contributed by invitation and were grouped under definite subjects for discussion or around definite problems. Individual papers were also given. In addition to papers a number of demonstrations and exhibits of various kinds were arranged in laboratories adjacent to the sectional meeting rooms.

The general rule that all communications must be in English, French or German rendered interchange of views feasible in such a polyglot assemblage and enabled free discussion to take place. The sectional meetings in practically all sections occupied both morning and afternoon throughout the week.

As just one example of the value of an international gathering of this kind very brief mention may be made of the work of the subsection on Nomenclature. This subsection was dealing with questions on which very great diversities of opinion are held and it was found possible to come to a harmonious and satisfactory basis of agreement.

In addition to the sectional meetings a number of general lectures were given in the evenings: these were by Mr. G. F. Hickson on Cambridge University and its Colleges; by Dr. W. M. D. van Leeuwen on Mountain Vegetation in Java; by Professor M. L. Fernald on Problems of Distribution in N.E. America; and by Professor H. G Lundegardh on Carbon Assimilation in relation to Ecology.

On Wednesday, August 20th, a plenary session was held for the reception of delegates. These numbered over 200 and represented Governments, Universities and Learned Societies in all parts of the world. At this meeting an invitation was extended to hold the Sixth International Congress in 1935 in Holland. Earlier on the same day the University of Cambridge held a special congregation when the Vice-Chancellor conferred honorary degrees on the following representative botanists:—

Dr. J. Briquet, Geneva; Professor L. Diels, Berlin; Professor J. G. Halle, Stockholm; Professor L. R. Jones, Wisconsin; Professor C. Schröter, Zurich; and Professor F. A. F. C. Went, Utrecht. Professor P. A. Dangeard, Paris, was the other representative but was unable to receive the degree as he was suddenly recalled to France before the ceremony.

In the afternoon of Wednesday, August 20th, the members were entertained at a garden party by the Master

of Downing College and Mrs. Seward in the garden of the college. In the evening of the same day the officers of the Congress, both general and sectional were entertained to dinner in the hall of Trinity College. On this occasion the admission of women to dinner in hall was allowed. The speakers at dinner were the President, Professor von Goebel, who received an honorary degree from the University of Cambridge on the occasion of the Darwin celebration in 1909, Professor Mangin, Professor Bower and the Bursar of Trinity College.

The final plenary session was held on Saturday, August 23rd, when the general resolutions passed by the sections were considered. This meeting formed the official close to a most successful, important and enjoyable week.

In adition to the regular meetings a number of excursions were arranged. These were either general or sectional and took place before, after or during the Cambridge meetings. It is neither possible nor necessary to give any details of these. Of the general excursions visits to Darwin's House at Down, Kent; to the Royal Botanic Gardens, Kew; to the Natural History Museum, South Kensington; and to Rothamsted Experimental Station, Harpenden, may be just mentioned. Of the sections, as is natural, that for Phytogeography and Ecology held the largest number of excursions. This section organised a tour of 5 days before the meetings for the study of English beech woods. The numbers were limited and members were invited individually. This excursion which was organised by Professor A. G. Tansley, formed a valuable introduction to a general discussion on beech woods which formed part of the sectional programme. A more prolonged tour through the South of England was held after the Congress. Many other shorter excursions were arranged but space does not admit of any account of them.

While time alone can gauge the final value of the resolutions passed by the Congress there can be no doubt at all in the minds of all who had the privilege of being present that botanical science as a whole benefited very considerably. The opportunities afforded for contact with other workers and for exchanging points of view on various problems have an importance quite beyond any adequate expression in words. This benefit is perhaps greatest for those who are working in countries, such as South Africa, where the number of their colleagues is not large, but the advantages are by no means entirely on one side.

While the problems arising for general discussion are naturally predominantly those arising in the older and more populated countries, such meetings as this form a ready means of introducing a wider outlook and of correlating and integrating the results obtained by workers who often have very divergent points of view. The interchange of views by botanists working in the anciently cultivated countries and in the newer and relatively unaltered regions cannot fail to produce results in the future. Perhaps it is not too much to hope that one contingent result may be that at some time South Africa may be in a position to extend an invitation to the International Botanical Congress to hold its meetings in this country.

Book Reviews.

"GNETALES" by the late H. H. W. Pearson. Cambridge University Press. 1929.

THE author of this volume was the founder and first director of the National Botanic Gardens, Kirstenbosch. He died in 1916, and it is a remarkable circumstance that as much as thirteen years should have elapsed after the death of the author before the publication of the book. Since almost the whole of the letterpress is given exactly as Professor Pearson left it, and as a large proportion of the figures are from published sources, it is difficult to understand why there should have been this long delay, especially as the book is comparatively short (about 200 pages).

Most of such revision and completion as was necessary was carried out by Mrs. Thoday. There can be no doubt that the task of completing a posthumous manuscript is likely always to be a delicate and difficult one, between the Scylla of adding things of which the author would not have approved and the Charybdis of not adding enough to make the work complete and up-to-date. Mrs. Thoday's task was doubly difficult on account of the considerable lapse of time after the original manuscript was written. She has certainly avoided the insertion of anything likely to have met with the disapproval of the author, but at the expense of making most of the interpolated paragraphs very colourless and non-committal. We think,

however, that the selection of published figures (for which, presumably, Mrs. Thoday was also largely responsible) has been, on the whole, very satisfactorily carried out.

Professor Seward, in an editorial preface, gives a brief account of the origin of the book, and refers to the long delay in its publication, though it cannot be said that he explains it. One short sentence from the preface, which we can heartily endorse, is worth quoting verbatim:— "Had Prof. Pearson lived to complete the manuscript the volume would have been a memorial worthy of an accomplished botanist and a man who was beloved both by his scientific colleagues and by a wide circle of friends in South Africa and in England; as it is, I can only express the hope that my fellow-botanists will share the view that even at this late date the publication of a contribution to our knowledge of an exceptionally interesting group of plants, by one who was particularly well qualified to speak with authority, is amply justified."

The portrait of the author which forms the frontispiece of the volume is a particularly pleasing one, and adds materially to its value, more particularly to the many South African botanists who knew him, and perhaps especially to the members of this Society which was founded by him. We do not think that anyone would hesitate to endorse the view that he was the most talented of the many botanists who have loved this country and have made it their adopted home.

The content of the volume is sufficiently indicated by the five chapter headings which are as follows:—

Chap. I. Habit. Distribution. Ecology. Taxonomy. (pp. 1-13).

Chap. II. Vegetative Morphology and Anatomy (pp. 14-51).

Chap. III. The Inflorescence and Flower (pp. 52-99).

Chap. IV. Reproduction (pp. 100-142).

Chap. V. Theoretical Chapter (pp. 143-185).

The last chapter is followed by a bibliography of rather less than 200 titles. The inclusion of a larger proportion of recent work bearing on the group would have added to its value.

In one respect at least we regard the presentation of the group as much more satisfactory than that employed by Fr. Markgraf in Vol. 13 of the second edition of Engler and Prantl's Pflanzenfamilien, and that is the fact that it is comparative throughout, whereas the German account is in three separate chapters, each devoted to a single genus, each being regarded by Fr. Markgraf as the type of a separate family. It seems a curious omission that no opinion is expressed in the book under review as to the classification of the three genera, though no one did more to elucidate the facts bearing on their relationship than the author himself.

The three plates, illustrating the habit of the three genera, are disappointing. Plate III, from a photograph by the author, of *Welwitschia* in its native haunts, might with advantage have been taken from one of the various other and much better photos which Prof. Pearson secured in the same locality. The other two plates are even less satisfactory as both are taken from specimens in cultivation, whereas the average reader would certainly prefer to see the native habit and habitat of plants so little accessible to botanists in general. The reproduction of these plates also leaves something to be desired; considering the small size of the book, the small number of plates and the cost of the volume, something better might have been expected.

It was almost inevitable, and also fitting, that stress should have been laid on those interesting and remarkable details of the life history of *Gnetum* and *Welwitschia* to the elucidation of which the author contributed so largely, and to the interpretation of which he brought a very wide botanical knowledge and a particularly acute and logical mind. As his researches were published in a number of papers contributed to several different scientific journals it is very convenient to have them all summarised here under one cover. It does not in any way detract from the value of the book that it is almost wholly a compilation from previously published work.

It is possible, perhaps probable, that some of the author's conclusions as to the origin and phylogenetic connections of the Gnetales might have been modified, had he lived, not so much in the light of new facts, of which, indeed, very few have been added since 1916, but in view of the rather rapidly changing attitude of the modern school of biological thought towards the more orthodox Darwinian views of evolution, which, in 1916, regarded the whole organic world as a phylogenetic tree, the gradual working out of the ramifications of which formed a remote, but still possible, background to biological research. In the last fourteen years the belief has been gradually gaining ground that evolution only operates within the phylum, while the various phyla of the organic world may have had a wholly independent origin. Had the author lived, and had he

postponed the publication of "Gnetales" till the year 1929, there can be little doubt that the new attitude would have found some reflection in the theoretical chapter of the book. Considered from the point of view of 1916 it is a most masterly presentation of the very interesting group with which it deals, and if something has been lost by carrying forward that presentation unchanged into a new scientific atmosphere we do not think that the blame can be laid at Mrs. Thoday's door. In any event the volume is quite indispensable as a summary of our knowledge of this very interesting group of plants, and will surely find its way to the shelves of every botanical library worthy of the name.

The printing and binding and general get-up of the book are such as we are accustomed to expect from the Cambridge University Press, and the number of minor errors which have eluded the vigilance of the proof readers is quite small. W.T.S.

J. H. Verduyn den Boer. "BIOGRAPHICAL NOTICES OF CAPE BOTANISTS." Nasionale Pers, Cape Town. 1929. 72 pp. and 23 illustrations. Price 2s. 6d.

This pamphlet was produced by the author as a souvenir for the Botanical Section of the British and South African Associations for the Advancement of Science. The greater part of it is a reprint of the address given by Peter McOwan as president of the South African Philosophical Society in 1886, which is thus made more readily accessible than formerly. The biographical details of early botanical collectors in South Africa are full of interest and are presented in McOwan's vigorous and racy style. Another welcome reprint is that of Dr. Schönland's obituary of McOwan himself, first published in the Kew Bulletin for 1910.

Included in these reprints are numerous portraits of Cape botanists and others, as well as a number of letters of intrinsic interest though of little relevance to the main subject of the pamphlet. We are indebted to Mr. Verduyn den Boer for recalling memories of our pioneers, their trials and triumphs, and the human qualities of persons who in the lapse of time inevitably tend to become mere names.

The Botanical Society of South Africa.

ANNUAL REPORT, 1929.

The Council has pleasure in submitting the Sixteenth Annual Report of the Society.

MEMBERSHIP.—The Membership of the Society stands at:—

Life Members	69
Family Members	57
Ordinary Members	625
Associate Members	382
Total	1,133

This is an increase of 87 as compared with last year, and shows a satisfactory growth of membership.

ANNUAL GATHERING.—The Annual Gathering of members took place as usual at the National Botanic Gardens, Kirstenbosch, and was held on Saturday, 28th September, 1929, and was very well attended, the weather being ideal. The experiment was tried at this meeting of holding the gathering rather earlier in the year to enable members to view the show of bulbous plants in flower at that time of the year. The Rt. Hon. Sir James Rose-Innes, President of the Society, addressed the gathering, and Professor Compton spoke on the general progress of the work at Kirstenbosch. After tea, parties were conducted round to the more interesting parts of the gardens.

MEETINGS OF COUNCIL.—Four meetings of Council were held during the year, and were well attended. At the Annual General Meeting held in April, the following office bearers were elected: *President*, the Rt. Hon. Sir James Rose-Innes, P.C., K.C.M.G.; *Vice-Presidents*, Sir Lionel Phillips, Bart; Sir Max Michaelis; J. B. Taylor, Esq.; *Members of Council*: Sir Drummond Chaplin, K.C.M.G., Professor R. H. Compton, Professor R. S. Adamson, Mrs. F. Bolus, Mrs. H. Carter, Mrs. Henry

Burton, Miss F. A. White, Miss E. Struben, Miss D. Fairbridge, Dr. Lilian Robinson, Lady Phillips, Wm. Duncan Baxter, Esq., W. de N. Lucas, Esq., Major G. B. van Zyl, M.L.A., W. A. Eaton, Esq., Dr. Bennie Hewat, H. C. Starke, Esq., F. E. Cartwright, Esq., *Hon. Secretary and Treasurer.*

JOURNAL.—During December the fifteenth volume of the Society's Journal was published under the Editorship of Professor Compton, Director of the National Botanic Gardens; the work contains many interesting articles by eminent botanical authorities. The Journal continues to elicit the warmest praise from Overseas institutions and forms a very valuable part of the Society's work. Through this medium new members are frequently added to the roll.

SEED LIST.—The Seed List published by the National Botanic Gardens, circulated with Journal to every member of the Society, brings every year heavier demands upon the staff, and in deference to representation made by the Gardens, the Council recommend that in future the number of packets of seed should be limited as follows: to Life and Family Members, 30 packets; Ordinary Members, 20 packets; Associate Members, 10 packets yearly. The privilege of obtaining the gratis distribution of seeds from the Gardens has always been much appreciated by members of the Society, as it enables them to obtain many species of indigenous and exotic plants hitherto unobtainable.

PROGRESS AT KIRSTENBOSCH.—Members of the Society received copies of the Annual Report of the National Botanic Gardens for 1928, and in this way were kept in touch with the progress of the Gardens. The report indicates an increase in all the various activities at Kirstenbosch.

The Succulent Garden, towards which the Society granted £600 from its Life Members' Fund, has now reached completion, and forms one of the leading features at Kirstenbosch. The payment of this amount from the Life Members' Fund has reduced it very considerably, and it is hoped that it may be possible to increase this Fund for future development work in the National Botanic Gardens.

CONTRIBUTION TO NATIONAL BOTANIC GARDENS.—As will be seen by the Financial Report and Balance Sheet, the surplus for the year amounted to £563 7s. 2d., the largest yearly amount your Society was able to grant from membership fees after deducting working expenses and cost of printing the Journal.

During the year under review, the British Association for the Advancement of Science met in Cape Town, when the Hon. Life Membership of the Botanical Society was conferred upon Professor Seward, President of the Botanical Section of the Association, in recognition of his work in Botanical Science. The recipient expressed his appreciation of the honour.

The Council have under consideration the production of a series of post cards for sale at the Gardens and other places. Mr. J. B. Taylor has very generously given a donation of £50 towards this object, and it is hoped that a very useful set of cards may be published, which would be of great benefit to Kirstenbosch.

The total number of visitors to the Gardens during the year was 44,979, a slight decrease on the number of visitors for the previous year, which is accounted for by the fact that for some months there was no bus connection between Newlands Station and the Gardens. The total number of seeds, plants and cuttings contributed to the Gardens during the year was 2,783. Members received during the year 3,862 packets of seeds, in addition to which several hundred cuttings, bulbs, etc., were distributed.

THANKS.—The Council has to express its indebtedness and sincere thanks to Mr. R. L. McDonald, for having audited the accounts; to the City Council and the South African Association for use of rooms for the purpose of holding meetings; also to the Press, for their valuable assistance in reporting the affairs of the Society.

LIONEL PHILLIPS,
Chairman.

List of Members of the Botanical Society,

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary. P.O. Box 267, Cape Town.

A.

Abbey, W.
ABBOTT, W. C.
Abercorn, Duke of
Abernethy, Miss O.
ADAMSON, PROF. R. S.
Ailsa, Marquis of
Ainslie, Miss F.
Ainsworth, J.
AKERMAN, CONRAD
Albrecht, C. W.
ALBU, SIR GEORGE, BART.
Alderson, Miss D.
Alexander, A.
Alexander, Miss E.
ALEXANDER, MRS. G.
ALI, H.H. PRINCE MOHAMED
ALICE, H.R.H. PRINCESS, COUNTESS OF ATHLONE.
Allison, J.
Allison, Mrs. J.
Alston, Dr. J.
Alston, Mrs. J. A.
Anders, Dr. H.
Anderson, Mrs. A. Murdoch
Anderson, Mrs. C. L.
Anderson, E. B.
Anderson, Mrs. T.
Andersson, E. J.
Andersson, Mrs. E. J.
Apsey, T. J.
Arbuthnot, Miss I.
Archbell, Mrs. J. E.
Arderne, H. R.
Arkwright, J. A.
Armstrong, C. W.
Armstrong, W. H.
Arnold, Dr. G.
Arnot, Miss.
ASHTON, DR. M. L.
Askew, F.
Astrop, J. H.
Attwell, A. B.
Augustus, I. S.

B.

Babbs, A. T.
Babbs, Mrs. A. T.
Bacon, Lt. Col. A. D.
Backhouse, J. S.
Bahlicke, Miss W.
Baillie, Mrs. B. M.
Bain, W. G.
Bain, Mrs. W. G.
Bairnsfather, K. C.
Baker, Mrs. C.
Baker, L.
Baker, Mrs. M. A. W.
Balfour, A. P.
Ball, W. R.
Ballantine, Dr. A. J.
Banks, Mrs.
Barclay, Miss E.
Barlow, W.
Barnard, Prof. T. T.
Barnes, Mrs. H. R.
Barnes, S. R.
Barr, P. R.
BARRETT, P. N.
Bartlett, Miss G.
Basson, Miss M. M.
Basson, N. J.
Bates, J. T.
Battenhausen, C. F.
Battenhausen, J. W.
Battenhausen, Mrs. J. W.
BAXTER, W. DUNCAN
BAXTER, MRS. W. DUNCAN
Beale, O. C.
Bean, D.
Bean, H. E.
Beard, Miss H.
Beard, H. R.
Beard, Mrs. W. A. M.
Beattie, Sir J. C.
Beattie, Lady
Beck, Lt. Col. A. A.
Beck, Mrs. A. A.
Beck, Lady Meiring
Beck, T. E.
Becker, Mrs. D.
Becker, T.
Bedford, H. J.
BEECROFT, E. E.
Beecroft, W. I.
Behr, C.
BEIT, SIR OTTO
Bell, A. B.
Benjamin, Hon. Mr. Justice L. E.
Bennet, H.
Bennet, Mrs. H.
Bennett, A.
BENNING, A. F. J.
BENTINCK, VICE-ADMIRAL SIR RUDOLF
Bergh, Miss J. C.
Bernard, Mrs.
Berry, H. O. W.
Bertie, Hon. A. M.
Bertish, H.
Bertram, Mrs. M. E.
Beverley, Miss M.
Bevis, A. L.
Bisset, W. M.
Blackbeard, Miss G. I.
Blackburn, H. W.
Blakeney, J. M.
Blathwayt, Mrs. S.
BLEEK, MISS D. F.
Blenkins, Mrs. W.
Blohm, Rev. W.
Bloom, O. H.
Bock, Miss S.
BODDAM-WHETHAM, MRS. R. E.
Bohling, Mrs. E.
Bolton, E. J.
BOLUS, MRS. F.
Bolus, H. H.
Booth, Mrs. A. S.
Booth, C. O.
Borcherds Mrs. J. S.
Borlose, Mrs. E. A.
Bosman, Mrs. A.
Bosman, Mrs. I. D.
Bothner, C.
Bowles, W.
Boxwell, Mrs.
Boyd, R. B.
Bradlaw, Mrs. A. R.
BRAKHAN, A.
Brand, A. M.
Brandmuller, E.
BRIMBLE, L. A.
Brink, A.
Briscoe, Mrs. J. E.
Britten, Miss L. L.
Broderip, E. F.
Broom, Mrs. A. H.
Broom, Mrs. M. B.
Brown, Professor A.
Brown, Mrs. M. G.
Brown, H. R.
Brownlee, Lt. Col. J. Innes
Bruins-Lich, H.
Brydone, R. R.
Buchan-Hepburn, Sir A.
Buckton, Mrs. F.
Buissinne, Mrs. W. T.
Bull, Rev. C. E. S.
Bullen, A. H.
Buller, A. C.
BULLEY, A. K.
Burdett, W.
Burkitt, Mrs. M.
Burleigh, R. F.
BURMEISTER, MRS. A. H.
Burns, A.
Burtt-Davy, Dr. J.
Burtt-Davy, Mrs.
Burton, Mrs. H.
Butcher, H. J.
BUTCHER, W.
Butler, W. B.
Butters, J. T.
Byng, Viscountess

C.

Cadman, Miss
Calderwood, Mrs. J.
Caldicott, Dr. W. A.
Campbell, Mrs. F. M.
Cape Natural History Club
Cape Peninsula Publicity Association
Cape Town Training College
Carter, Miss B.
Carter, Mrs. H.
Carter & Co., Geo.
Cartwright, F. E
Cartwright, Mrs. F. E.
Cartwright, J. Stewart
Cartwright, Mrs. J. Stewart
Casalis C. E. M.
Casalis, Mrs. C. E. M.
Casalis, Mrs. G. M.
CASE, MISS M. R.
Castle, F.
Cave, Miss E.
Centlivres, Mrs. F. v. d. S.
Chamberlain, Dr. C. J.
Chamberlain, Miss M.
Chamberlain, W. S.
Champness, Mrs.
Chandler, Miss C.
Chandler, Miss L.
Chaplin, Sir Drummond
Chappell, Sir Ernest
Chase, N. C.
Cheetham, Miss
Chubb, Dr. E.
Churchill, Senator the Hon. F. F.
Churchill, Mrs. F. F.
Cillie, Dr. G.
Cillie, Mrs. G.
Cilliers, Mrs. J. J.
City Tramways Co., Ltd.
Clare, T. C.
Clark, W. E.
Clark, Mrs. W. E.
Clarke, Mrs. C. J.
Clarke, E. D.
Clarke, Miss E. V.
Clarke, Miss F. E.
Clarke, H. C.
Clarke, J.
Clarke, Col. Stephenson R.
Clarkson, Mrs. C. F.
Clayton, Senator the Hon. W. F.
Cleaver, Sir Frederick
Cleghorn, Mrs. B. H.
Cloete, Miss C.
CLOETE, MRS. HENRY
Cloete, Mrs. P.
Close, J. E. P.
CLOSE, ADV. R. W.
Cloud, Mrs. J. W.
Cluver, P.
Cluver, Mrs. P.
Cochrane, C.
Coles, Rev. H. J.
Collegiate School for Girls, Port Elizabeth
Collingwood, Mrs. E. M.
Collyer, Miss F. H.
COLTON, MRS. W.
Compton, Prof. R. H.
Conradie, D. G.
Cook, Miss
Coombes, G.
Cooper, Mrs. W. E.
Cooper, Mrs. W. V.
Copenhagen, Mrs. J. W.
Cornelius, W.
CORY, R.
Couldrey, Mrs.
Coulter, Mrs. W. A.
Couser, W. T.
Cousins, Mrs. F.
Coutts, Mrs.
Coutts, Miss E.
Cowlisham, G. K.
CRAIG, J. W.

Crampton, Rev. W. Morley
Creswell, Mrs. F. H. P.
Crider, F. J.
Cunningham, C. M.
Currey, Hon. H. L.

D.

Dahlem Botanical Museum
Dale, D.
Dale, Mrs. H. R.
Dallas, Mrs.
DALRYMPLE, COLONEL
Dalrymple, G. H.
Dalziel, Major E.
Daneel, Dr. P. M.
Daniell, G. V.
Darke, Miss E. B.
Darter, G. B. S.
Darter, Mrs. E. L.
Davies, M. L. de Waal
Davies, V. E.
Dawson, W. F.
Day, Miss M. J.
DEACON, MRS. J.
De Beer, Mrs. A. A.
De Jager, Miss I.
De Kock, C. G.
De Kock, K.
De Lafont, Mme.
Delbridge, Miss
DE LINDT, DR. R.
De Mole & Kisch
Dent, Mrs. C. H.
Denton, W.
DE PASS, A. A.
De Villiers, Mrs. B.
De Villiers, Mrs. C. C.
DE VILLIERS, MRS. LOCHNER
De Villiers, Hon. Mr. Justice M.
De Villiers, Mrs. M.
De Villiers, Miss W.
DE VILLIERS, LORD
De Villiers Street School
De Wet, H. C.
De Wet, P. J. S.
Diamond, Mrs. F. W.
Diep River School
Diepraem, J. H.
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Divine, Mrs.
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Van Heerde, H.
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Y.

Young, W.
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BOTANICAL SOCIETY OF SOUTH AFRICA.

BALANCE SHEET as at 31st December, 1929.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Life Members' Fund 1/1/29	480 0 0		S. A. Milling Co., Ltd., Deposit on call	250 0 0	
Added during year	125 0 0		Accrued Interest	5 0 0	
		605 0 0			255 0 0
Less amount voted as second grant towards completion of Succulent Garden at Kirstenbosch		300 0 0	Union of South Africa, 5% Stock 1929/39 at cost	300 0 0	
			Accrued Interest	4 7 1	
		305 0 0			304 7 1
Subscriptions paid in advance		74 4	Sundry Debtors for Journal Advts.		24 0 0
Special fund for advertising propaganda of Kirstenbosch, per J. B. Taylor, Esq.		50 0 0	Cape of Good Hope Savings Bank, plus interest		136 15 0
Specialty Press of S.A.		106 15 9	Cash in Bank		379 5 4
National Botanic Gardens, surplus for 1929		563 7 2			
		£1,099 7 5			£1,099 7 5

Revenue and Expenditure Account for 12 months ended 31st December, 1929.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Annual Gathering at Kirstenbosch	20 19 6		Subscriptions—		
General Expenses	28 0 2		Ordinary	506 16 5	
Clerical Assistance	30 0 0		Family	122 12 0	
Bank Charges	3 18 7		Associate	77 15 0	
Stationery and Printing	23 12 10				707 3 5
Entertaining Expenses	1 4 2		Sales of Journals		1 17 6
Journal 1929 (less Advertisements)	70 17 1		Interest		32 18 7
Surplus for 1929	563 7 2				
		£741 19 6			£741 19 6

Audited and found correct,
R. L. McDONALD,
Auditor.

Cape Town,
11th March, 1930.

(Signed) LIONEL PHILLIPS,
Chairman.
FRANK E. CARTWRIGHT,
Hon. Treasurer.

THE BOTANICAL SOCIETY OF SOUTH AFRICA.

OBJECTS:

(*a*) To encourage the inhabitants of South Africa to take an active part in the progress and development of the National Botanic Gardens at Kirstenbosch, a part of the Groote Schuur Estate, in the Cape Province, and to induce them to appreciate their responsibilities therein.

(*b*) To augment the Government grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch.

(*c*) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

(*d*) To enlighten and instruct the members on botanical subjects by means of rambles, meetings, lectures and conferences, and by the distribution of literature.

FOUNDED JUNE 10th, 1913.

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All Members have the privilege of sharing in the free distribution of surplus seeds, etc., from Kirstenbosch, on application to the Director of the Gardens. The Journal of the Botanical Society, published annually, is sent free to every Member on publication.

Those wishing to become Members of the Society are invited to communicate with Mr. F. E. CARTWRIGHT, *Hon. Secretary*, P.O. Box 267, Cape Town.

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THE JOURNAL OF THE

BOTANICAL SOCIETY OF SOUTH AFRICA

Edited by R. H. COMPTON, M.A., F.R.S.S.Af., Director of the NATIONAL BOTANIC GARDENS

Part XVII 1931

KIRSTENBOSCH,
NEWLANDS, C.P.
SOUTH AFRICA.

Published under the authority of the Council of the Botanical Society.

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PLATE I. Springtime at Kirstenbosch.

The Journal of the Botanical Society of South Africa.

EDITED BY R. H. COMPTON.

PART XVII 1931

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News and Notes.

IN common with other state-aided institutions, Kirstenbosch has suffered a ten per cent. reduction of its Government grant and the problem arose how to economise on an expenditure already meagre in the extreme. Small cuts were made in various directions, and it was found possible to avoid dismissal of workmen by transferring some to construction work financed from capital funds. These funds are however approaching exhaustion and in the absence of an increased revenue and/or further benefactions it may be necessary before long to reduce the Gardens personnel. Fortunately there are two circumstances in which the Gardens can find encouragement. One is the fact that owing to the expenditure of money on garden construction, nursery buildings and so on, work is actually more economical than it has been before: that is, better results can be obtained at less cost; there are fewer disappointments and less waste. The second cause for hopefulness is the steady increase in the membership of the Botanical Society, in spite of the depression. The figures quoted below show how, through all their vicissitudes, the Botanical Society has been the sheet-anchor of the Gardens; and at times like the present, it is a matter for sincere congratulation that increase of membership to some extent countervails the fall of revenue from other sources.

* * * * *

The following table shown the steady progress made by the Botanical Society since its inception.

	Life.	Family.	Ordinary.	Associate.	Total.
1914	33	22	264	33	352
1915	46	26	263	32	367
1916	49	26	264	45	384
1917	46	24	249	53	362
1918	49	28	281	78	436
1919	50	38	320	84	492
1920	54	45	384	237	720
1921	54	48	407	287	795
1922	55	52	418	301	826
1923	59	50	405	269	783
1924	62	57	455	313	887
1925	62	58	462	330	912
1926	65	60	481	341	947
1927	68	60	522	353	1003
1928	66	54	581	345	1046
1929	69	57	625	382	1133
1930	71	76	718	414	1279

The grant made by the Society to the Kirstenbosch funds this year (being the balance on the 1930 working) was again a record, namely £649 11s. 8d.

* * * * *

But the Society cannot rest on its laurels (if one may be permitted to mention an exotic plant in this connection!). More than ever at the present times of crisis does Kirstenbosch require increased support, moral and financial. Its value to South Africa is increasing every year, and so is its importance in the eyes of the botanical and horticultural world. It is worth while supporting Kirstenbosch. As a writer in the Cape Times puts it — "From a publicity viewpoint alone, the full maintenance of Kirstenbosch as a National Botanic Garden would be an excellent investment at anything from £25,000 annually. Next to the Mines and Victoria Falls, Kirstenbosch to-day appeals more to visiting tourists than all other attractions..... With such an object — the development and preservation of Africa's unique flora, and the maintenance of the most glorious nature garden in the world — it might be thought that 50,000 subscribers would be easily obtained. If South Africans were sincere in their protestations, Kirstenbosch is the one essentially South African institution that should command, not only the sympathy, but the financial support of everyone."

* * * * *

During the past year work has been proceeding steadily on the Cycad Amphitheatre and the south side of the Fern Dell at Kirstenbosch. A scheme costing just over £1,000 has been nearly completed by which stormwater drainage has been laid along all the paths in this area, low retaining walls have been built, and the paths themselves have been paved with small flat cobbles. The result has been a great improvement in the appearance of this interesting part of the Gardens and in the convenience of visitors, while at the same time there has been no loss

of its informal character. Work is proceeding on the area formerly used as a nursery; this involves the placing of a large number of rough-stone steps, a new layout of paths with stormwater drainage connected to the main system, and a regrading of the ground. When this is finished a link can be made with the Succulent Garden, and this will be a matter for future development. At the present moment a scheme is being considered for the drainage and development of the area formerly used as a forage field between the Succulent Garden and the Mesembryanthemum Bank. This will exhaust the remainder of the available capital funds of the Gardens. The work in the Cycads and Dell is an example of the use to which money can be put at Kirstenbosch : the source of these funds was mainly the late Dr. de Korte, whose bequest of £2,000 has been a godsend to the Gardens. There is need for further benefactions for Gardens development: and we appeal to our readers, who, even if they are unable to make immediate donations to the funds, can make provision in their wills by which the future growth and usefulness of Kirstenbosch may be secured.

* * * * *

Sir Arthur Hill, Director of the Royal Botanic Gardens, Kew, who visited South Africa at the end of 1929, sent a Report on his tour to the Union Government. We have his permission and that of the Prime Minister to publish part of this Report in the Journal of the Botanical Society, and our readers will find much in it to interest them. In particular, members of the Botanical Society will be gratified by Sir Arthur's appreciation of the work of the Society and of Kirstenbosch. We trust that the Government will take due heed of Sir Arthur's advice as to the provision of adequate funds for the development and maintenance of the Gardens, and will act upon it when better times return. We heartily support the recommendations with regard to nature conservation, and we are glad to be able to say that the reservation of Table Mountain as a nature sanctuary, so strongly advocated in the Report, is an accomplished fact.

* * * * *

The Report shows that Sir Arthur appreciates the possibilities for botanical research in South Africa and the benefits, material and intellectual, that would accrue if this were carried out on an adequate scale. At the same time it may be doubted whether the Union could reasonably contemplate the establishment of three co-equal Botanic Gardens: in fact an attempt of this kind might lead to the same sort of overlapping and unnecessary expense that exists in our University system. Pearson's original idea was more practicable and more economical, namely to establish a National Garden at Kirstenbosch with subsidiary Gardens in other centres of different climatic types. The Karoo Garden at Whitehill is an example of this kind, and its work very usefully supplements that of Kirstenbosch. Real botanical progress will be made by this method, whereas the creation of additional comprehensive " National " Gardens, all with equal claims for Government support would infallibly lead to ruinous local jealousies; and in this country of limited population and means all the Gardens would starve on a total appropriation on which one National Garden might live and do good work.

* * * * *

When one considers that the total amount available for the annual maintenance of Kirstenbosch is about one-twentieth part of that spent at Kew; and that last year's total expenditure at Whitehill was only £184 10s. 8d. (a fact which has aroused astonished comment in the newspapers) ; when one realises, as those who have anything to do with the National Botanic Gardens do, how much effort is required to obtain that sum and how economical, not to say miserly, has its expenditure to be; then one can only conclude that the foundation of additional Gardens on similar lines, however desirable in the interests of science and human welfare, is entirely utopian for South Africa as she is. The great need is adequate support for one National Botanic Garden — Kirstenbosch — and the opportunity for substations such as Whitehill.

* * * * *

The question of sales by Botanic Gardens is referred to by Sir Arthur Hill in his Report. Sir Arthur strongly criticises the practice of several public gardens in South Africa by which they virtually enter the nursery trade. To avoid misunderstanding it should be emphasised that no seeds or plants are sold from Kirstenbosch or Whitehill to private individuals. The whole question was carefully considered by the Trustees some years ago, and it was concluded that, not only was there no objection to the sale of seeds to the trade only, but that this was the most practical method of bringing South African species within reach of the gardening public here and overseas. This policy in no way sets the Gardens in unfair competi-

tion with commercial firms; on the contrary it assists them and tends towards the creation of markets for them. The production of seeds from indigenous plants is regarded as a piece of economic work with the object of finding new openings for cultivators and of establishing a seed-growing industry in South Africa.

* * * * *

The Edward Muspratt Solly Scholarship, value £100, tenable at Kirstenbosch, is awarded annually for purposes of botanical research and study. Particulars may be obtained on request from the Director. The date for receiving applications for the Scholarship is usually 1st December each year. This year the Scholarship has been held by Miss C. G. Crocker, M.Sc. of the University of the Witwatersrand who has been engaged in investigating the anatomy of certain ferns and in cytological studies in connection with self-sterility and allied phenomena.

* * * * *

The genus Ixia includes some of the most daintily attractive of Cape bulbs: not only are they of a slender grace which contrasts charmingly with the more robust glories of our Watsonias and Gladiolus and the dwarfish splendour of our Babianas and Sparaxis, but many of them have a delicate colouring which is unique. Moreover, no Cape bulbs are easier to cultivate. On the botanical side we are learning much about Ixias, and the article which Miss Lewis has written and illustrated for this Journal gives a short account of present knowledge of what is rapidly becoming a large genus. Mr. Mathews has also contributed an article on Ixia from the gardening point of view. It is rather surprising how few species of Ixia are grown in private gardens, and it may be hoped that these articles will direct attention to some of the most alluring of our indigenous plants.

* * * * *

The propagation of Lachenalias by leaf cuttings is dealt with by Mr. Henry H. Cook of the Reading University Horticultural Department, who discovered the method and who has thus opened up what may prove to be a very useful piece of garden practice, probably applicable to other bulbous plants also. From the botanical standpoint propagation by leaf cuttings is of great interest and rarity: in general a leaf is a highly specialised organ of the plant, and has usually lost the potentiality of producing new stems and roots: just as a lizard can grow a new tail to replace one lost, but a tail cannot grow a new lizard. Several instances of propagation from leaves are known, however. The Mother Fern (*Asplenium bulbiferum*) is a familiar example, and among flowering plants we have the well known cases of Begonias, regularly grown from leaf-cuttings, and Bryophyllum a leaf of which if detached and hung up in the bathroom will produce a new plantlet at each notch. Among our succulents, too, the quickest method of propagation of Gasterias and some Crassulas is by leaf cuttings. Many of our bulbs can produce bulbils or "pips" from their fleshy bulbscales, which are really specially modified leaves. Alongside Mr. Cook's photograph of Lachenalia leaf cuttings we print a photograph of old leaves of a double white Ornithogalum, which regularly produces dozens of bulbils on each leaf-base: this variety owing to its doubleness sets no seed, and vegetative propagation acts as an efficient substitute.

* * * * *

During the spring of 1931 the slopes to the left of the main entrance of Kirstenbosch, as well as the lawn and the terrace, presented by far the finest colour spectacle which has so far been achieved in the Gardens. This was produced by mass planting of annuals and perennials, mainly Compositae, and mainly native of Namaqualand and the western sandveld. A large proportion of the species responsible for this dazzling display were obtained by Mr. Mathews on collecting trips: and these were made possible by grants from interested persons overseas. Money available for such a purpose enables the employment of skill and experience, and this again leads to results altogether disproportionate to the original expenditure. Not only was there a riot of colour and the promise of more, but new additions to knowledge have been made and old problems solved by these expeditions: and the world generally is enriched by new additions to the beauty of its gardens. It is certainly worth while to support Kirstenbosch.

In an article printed below Mr. Mathews says a few words on some of the outstanding decorative plants recently introduced into cultivation by Kirstenbosch: these representing, as will be recognised, a mere sample or fragment of the floral wealth that the Gardens is making available to all.

* * * * *

Largely as a result of the representations made by the Botanical Society, and after negotiations with the various bodies concerned, the Administrator of the Cape Province has proclamed Table Mountain a nature reserve, giving complete protection by law to its flora and fauna. With

the exception of certain areas on the slopes of the Apostles in private ownership, therefore, the wild life of the Mountain is now in public guardianship: and provided that the law is faithfully administered, there is now an opportunity for the gradual recuperation of the past glories of the Mountain and for its establishment as an unique sanctuary for plant and animal life at the very doors of the Mother City. Further steps have also been taken in the case of the mountains lying between Constantia Nek and the Fish Hoek-Noord Hoek gap, and on the request of the Botanical Society and Sir Drummond Chaplin, (owner of a large part of the Noord Hoek Mountain) the Cape Divisional Council has advised the Administrator to proclaim this as a nature reserve also: it is upon this group of mountains, even more than on Table Mountain itself, that depredations are made by commercial flower pickers.

The new proclamations have met with warm approval: and now vigilance is necessary and a spirit of public co-operation in order to ensure that the plain law shall not become a dead letter. Any persons picking flowers, no matter how common, shooting birds or animals, digging bulbs etc. in the public parts of Table Mountain are liable to a fine: moreover their capture will be much easier now than it was formerly!

* * * * *

During 1931 it was found possible to arrange for the installation of a municipal electrical service at Kirstenbosch, and to put an end to the manifold inconvenience, waste and danger of the existing methods in the various buildings on the estate. The Harold Pearson Memorial Hostel and the Tea House, in addition to electric lighting, have electric cooking and water-heating. The residences of the European staff are all connected to the mains. The Bolus Herbarium has installed a system of electric heating with thermostatic control, in order to safeguard the collection of plants and books from damp. The scheme has been greatly assisted by private generosity, and the actual cost to the Gardens has been reduced to a small amount.

* * * * *

The late Miss Nettie de Jager, while Lady Warden at the Hostel, started a fund with the object of assisting gardening student-apprentices at Kirstenbosch in case of need during their time of probation. After her death small donations were made to the fund by private gifts and otherwise, but it had only reached an amount which was insufficient for its original purpose. Those in charge of the fund resolved therefore to apply it to some other purpose in connection with Miss de Jager's work, and handed the money to the Trustees for the purchase of electrical equipment for the Hostel. It was felt that Miss de Jager would have approved of this, and of the resulting great increase in the comfort and convenience of those living at the Hostel, as compared with the conditions in which she herself worked. A portrait of Miss de Jager has been placed on the walls of the new Hostel which she herself did not live to see.

* * * * *

We publish two Kirstenbosch photographs of more than ordinary pictorial quality. Plate V is from a photograph by Mr. H. F. P. Middleton, formerly of Cape Town, and represents a scene on the Contour Path near Nursery Gorge where sunlight is tempered by indigenous forest. This picture won the first prize of £50 in the Scenic class of the recent Kodak competition, and is reproduced by kind permission of Kodak (S.A.) Ltd., the holder of the copyright. From the botanical point of view this picture shows the result of the timber-hunting depredations of the early settlers at the Cape, the densely clustered tree trunks being mainly coppice growth after felling. In the Kirstenbosch forests but few large trees have survived the axe, these being either ironwood or such as were relatively inacessible.

* * * * *

Plate II is from a photograph by Mr. Cumming-George and shows a well-known scene in Kirstenbosch from an unfamiliar angle. One recognises the balustrade at the Bath, the big Cape Ilex trees, young silver trees, a Cussonia in the foreground, Cycads behind, and glimpses of the new rough-stone walls and steps leading up as it were to the mighty background of Fernwood Buttress.

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The Frontispiece in colour is reproduced from water colour drawings of Kirstenbosch by Mr. C. S. Groves and Miss D. Barclay respectively. Six of these paintings were made by these artists, and picture postcards have been made from them. They can be purchased at threepence each, or 1/6d. the set in an envelope, on either matt or glossy boards, at the Kirstenbosch Tea House or a booksellers, or from the printers, Specialty Press, P.O. Box 21, Wynberg. The financing of the issue was made possible through the generosity of Mr. J. B. Taylor. The postcards make an attractive memento of the Gardens, and are a pleasant change from the more stereotyped photographic souvenir.

Botany in South Africa.

SIR ARTHUR HILL'S REPORT.

IN the course of a report on his recent visit to the Union of South Africa, Sir Arthur Hill, K.C.M.G., Sc.D., F.R.S., Director of the Royal Botanic Gardens at Kew, makes the following observations:—

Botanic Gardens. Except for the National Botanic Gardens, Kirstenbosch, and the Garden at Pietermaritzburg, owned by a Society, the Union with its wonderful diversity of flora and climate has no other Botanic Gardens worthy of the name.

At Durban, which should be the centre for the display of the interesting sub-tropical flora of Natal, the " Botanic Gardens " built up by the late Dr. Medley Wood have now passed under the control of the Municipality and are little more than a charming Public Park; while at Pretoria which is the centre of botanical activity of the Union, there is as yet no Botanic Garden though a remarkably interesting collection of native Aloes, Cycads, etc., has been planted among the rocks of the hill-side on which stand the noble Union Buildings.

Kirstenbosch is due to the energy of the late Professor H. H. W. Pearson and is maintained, unfortunately on a quite inadequate scale, by private benefactions, by the Botanical Society and by a Government grant.

Situated as it is on the slopes of Table Mountain in the midst of a unique flora, Kirstenbosch can and should become one of the most renowned Botanic Gardens of the world. It has the good fortune to be closely associated with the University of Cape Town and with the Bolus Herbarium — ideal conditions, which ensure that its educational value and its scientific possibilities could be developed to the greatest possible advantage. It also affords many possibilities for research with regard to essential oils, genetical work and in other directions which are needed on economic lines in the Cape Province.

At present, owing to lack of funds, the Director is working single-handed and the garden staff is inadequate. I feel I am on safe ground in stating that the whole botanical world looks to the Government of the Union to assist Kirstenbosch financially, so that its great possibilities may be fully attained and that it may be able to carry out the research work, which cannot fail to be of benefit to the economic welfare of the Cape region and a worthy memorial to Harold Pearson its Founder.

Durban offers great possibilities for the development of its existing Public Gardens as a fine Sub-Tropical Botanic Garden, whose value would be felt throughout Natal. Like Kirstenbosch it could have its association with a University institution, and it already has in its midst that important and vital adjunct of a Botanic Garden, the fine *Natal Herbarium* built up by the energy of the late Mr. Medley Wood. It also has the advantage of having situated in the grounds the laboratories and houses where virus diseases of sugar cane, maize, etc., are being studied by scientific officers attached to the Department of Agriculture centered at Pretoria. Conditions at Durban, therefore, are ideal for the formation of a Botanic Garden associated with herbarium work and with the research work necessary for the development of the many economic activities of Natal as regards the vegetable kingdom.

Further, as at Kirstenbosch, the educational value of such a garden to the University Colleges and Schools at Durban and Maritzburg hardly need emphasis any more than does its value to planters, residents and visitors.

Pretoria has a great opportunity for developing a Botanic Garden, with a Arboretum of native trees, in the Fountains Valley and adjacent hill-sides worthy of the Northern capital of the Union. Here again there is the National Herbarium, the headquarters of the Forestry and Agricultural Departments, the University and schools, all of which demand for their full development the creation of a fine Botanic Garden with an Arboretum closely associated with the Forestry Museum. Since the site is ideal for the purpose and the Municipal authorities fully realise the value of the project, I have great hopes that it may not be long before Pretoria sets out to establish a Botanic Garden of some 300-500 acres, worthy of the capital.

These three Botanic Gardens to which I have referred should, I consider, be co-equal and quasi-independent. Each should have its own Governing Body or body of Trustees, and it would be desirable that the Chief of the Division of Plant Industry, Pretoria, should be a member of each Governing Body. It should, however, be arranged that each garden with its associated herbaria and laboratories should carry out the research work for which they are particularly fitted, without undue control from headquarters, and that harmony and co-operation rather than

Photo: W. Cumming-George.

PLATE II. In the Heart of Kirstenbosch.

subordination and compulsion should be the recognised guiding principles.

I cannot but feel in this connection that it is somewhat unfortunate that the word "*National*" has been adopted both at Kirstenbosch for the *Garden* and at Pretoria for the *Herbarium*, since neither can be truly "National" as representing all the botanical wonders of the Union. A garden established at Durban, for instance, might also wish to be given such a title. Cape Town possesses historical South African Herbaria, while Pretoria and Durban can establish Gardens representative of their own peculiar conditions, as has been done at Kirstenbosch. I venture to suggest that botanical enterprise in the Union would be greatly enhanced and encouraged were the term "National" abandoned, and the three great centres of botanical activity, Kirstenbosch, Durban and Pretoria, regarded as being co-equal, harmoniously working together in co-operation for the advancement of Botanical Science.

Before leaving the subject of Botanic Gardens, I should like to refer to the practice of allowing the Superintendent in some of the gardens I visited to propagate plants for sale. This is a mischievous arrangement and usually tends to the garden being neglected, since the Superintendent is anxious to obtain the necessary funds for maintenance by sales of plants. Trading of this kind, I consider, should be left to the Nurserymen and in no true Botanic Garden should such a procedure be allowed. In a Botanic Garden the energies of the Curator or Superintendent should, under the Director, be devoted wholly to the care and improvement of the gardens and the botanical collections.

Reference must be made to the fine Botanic Garden at Pietermaritzburg with its remarkable collection of exotic trees and shrubs. This is worthy of being maintained at its present high level and I hope every effort will be made to increase its usefulness and to provide the necessary funds for its proper upkeep. Here, unfortunately, the real work of the Garden is greatly hampered by the Superintendent having to devote much of his time to the propagation of plants for sale, to the detriment of his proper work which should be the development and maintenance of the collections.

I must now refer to the excellent work which is being done by the Botanical Survey of South Africa and by the Botanical Society of South Africa. Much is being learnt about the flora through the activities of the members of these two important organisations, and it is to be hoped that as a result of the work, more particularly of the Botanical Society, a more general interest will be aroused in the unique vegetation of the Cape and Karoo regions in particular, and that all acts of vandalism and destruction of rare native plants will be discouraged and prevented. I cannot help referring to the possible disappearance of rare and remarkable plants through the activities of "collectors" of "Wild flowers" for Flower Shows, and to the lavish use of unique native plants for the decoration of motor cars etc., at such functions; a practice which is causing alarm to botanists and plant lovers in South Africa, Great Britain and throughout the Botanical World.

The formation of Botanical and Forestry Reserves, coupled with the creation of Botanic Gardens, is, I consider, one of the most important matters that can be undertaken in South Africa or in any country. I refer in particular to the Karoo Garden at Whitehill, under the control of Kirstenbosch, where the remarkable Karoo vegetation is so admirably displayed and to the Veld Reserve at Fauresmith. The enclosed Kopje at Fauresmith affords a unique opportunity of studying the growth and development of the native vegetation under natural conditions and the changes which have already been noticed during the short time grazing animals have been excluded from the Kopje are very striking. Valuable results will be forthcoming from the experiment in connection with questions relating to over-grazing, soil erosion and kindred matters, and the careful ecological study of the vegetation will be valued by botanists, and will afford much information to agriculturists both in the drier parts of the Union and in other similar parts of the Empire.

The careful study of the different Karoo and other plants from the chemical and nutritive points of view, as well as their resistance to drought and grazing and their recuperative powers, is already yielding valuable results and the laboratories and grounds and experiments are a great tribute to the sagacity and foresight of the Chief of the Division of Plant Industry and to the ability and courage of the Research Officer stationed at Fauresmith.

With regard to Forestry matters, I am not of course competent to speak in any detail, but I should like to say how pleased I was to find what large areas of native forest had been reserved in the Knysna region and that these forest areas with their fine trees will be preserved; also I hope that greater efforts will be made both to plant areas with native trees and to conserve such native trees as are still left throughout the Union. The importance of this needs some emphasis I feel, when so much activity is being displayed in planting large tracts of country with *Pines*, *Eucalyptus*, *Wattles*, etc. Necessary as this development undoubtedly is, I do venture as a botanist, to appeal for

the conservation and planting of the indigenous and peculiar trees belonging to South Africa, so that as far as possible some features of the original state of the country may be maintained.

This leads me to refer to *Table Mountain* itself, and I venture to express the hope I expressed in Cape Town and elsewhere, that *Table Mountain* should be kept sacred as a *Reserve*, and that no more planting of exotic trees and shrubs should be allowed on this unique botanical area. In particular it is most desirable that the Pine trees, Hakeas and other exotic plants, which are now spreading up Orange Kloof and Disa Gorge, should be removed and that steps should be taken to prevent the incursion of any exotic plants among the unique vegetation on the higher slopes of Table Mountain.

Another serious danger which is imperilling the Table Mountain flora is constant fires, which often spread far beyond the "farmed" areas which it is intended to burn over. It would be a measure of great value if the area could be so reserved that intentional fires could be entirely prevented — since the harm they do is wellnigh irreparable — and the wonderful Silver tree belts at Kirstenbosch and elsewhere may be involved and destroyed, unless stringent precautions can be taken. The Table Mountain flora is so unique a heritage that no pains should be spared to preserve it, as it is, as far as may be possible for all time.

While speaking of "Reserves," I should like to urge the need of reserving and fencing a large area on the *Grahamstown Hills* above Howieson's Poort. Here, as on Table Mountain, there is a remarkably interesting type of vegetation which is worthy of the greatest care. Its value is enhanced by its proximity to Grahamstown, with Rhodes University College and the Albany Herbarium, and for educational reasons alone a large reservation here is greatly needed. Unfortunately, exotic trees, Opuntias and other plants are now rapidly spreading among the interesting native plants, so action should not be delayed, and I trust the authorities will take steps to clear away the exotic plants and fence and reserve a large area of native vegetation, which would be of great educational value to students and plant lovers of this beautiful university town.

The officers of the Botanical Survey are doing much to secure reserved areas where interesting native plants are found and it is to be hoped that the Government will be able to give full support to their very laudable efforts.

In connection with "Reserves" I need hardly point out the great dangers which result from the constant *burning of Bush and Veld*, especially when this occurs on the water catchment areas — the resulting erosion, formation of sluits, etc., is only too evident in many places. There can be no doubt that in places the water supply, since it cannot be held on the hillsides, is being largely lost in areas where it is most needed. The spread of the Bracken fern on the burnt hill-sides and the loss in fertility of the soil are often only too painfully evident. The experiments now in progress at Fauresmith are yielding results which should go far to improve the present state of affairs in the drier parts of the Union.

The *Department of Agriculture* is doing excellent work in many useful directions, as shown by the remarkable display of its activities, which was arranged in my honour at the Government Reception accorded to me at Pretoria on December 18th. The programme prepared for the Reception sufficiently indicated the wide activities of the Division so successfully presided over by Dr. Pole Evans. I should, however, like to refer especially to the work that is being done at Prinzhof with pasture grasses, since this I consider is of paramount importance to agriculturists, especially in the Transvaal, and opens out many abstruse botanical problems.

Here Dr. Pole Evans has collected some 85 different forms of the valuable Woolly Finger Grass (*Digitaria eriantha*), from various parts of the Union, and is studying them as regards their resistance to drought, grazing and recuperative powers, and also as to their nutritive value. The plots of the several forms, as I saw them at the end of a long drought of six months — some having been constantly grazed for over a year — were most interesting, and the power of resistance to drought and grazing very instructive. Many of the strains which were ungrazed showed marked differences, some being in flower, others brown and dried, many with long stolon shoots covering the ground, some with green, some with bluish-green leaves, etc. Until recently all have been considered by botanists to be the one species *D. eriantha*, but it is evident that these 85 strains, all propagated vegetatively from individual, wild-collected plants, will cause botanists to revise their opinions as to what exactly constitutes a species. The further results of this important piece of work will be eagerly awaited and it is very gratifying to learn that the Union Government have been so much impressed by the importance of the work to agricultural progress in the Transvaal, that they have set aside a large area at Rietondale for the expansion of the experiments.

Sunday's River Valley. Among the many places of interest that I was enabled to visit, a brief reference may

be made to the Sunday's River Valley. Here it would seem that various minor economic agricultural or horticultural products might be considered, since conditions seem to be admirably suited for their cultivation. Among the plants that might be tried I would suggest "Lavender" — the true Lavender is now in cultivation at Kirstenbosch, having been sent out by Kew; — Santonin, Pelargonium for oil — this also is under cultivation at Kirstenbosch, Carnations for the Port Elizabeth market, and flower seeds might well be raised here to supply nurserymen both in Great Britain and in South Africa.

The country here would also appear to be suitable for the cultivation of *Aleurites Fordii*, one of the sources of Tung Oil, and of Olive Trees to provide a supply of Olive Oil for which there should be a fair market.

I have been duly impressed with the fine results which have been achieved in the various towns I visited in the matter of *Public Parks* and *Gardens*, and street planting, and I feel no small pride in knowing that in the majority of cases the beautiful effects were due to Student Gardeners sent out from Kew. Port Elizabeth in particular is a striking achievement in the way of fine horticultural results, and Cape Town, Bloemfontein, Maritzburg, Durban and Pretoria all owe much of their beauty to the efforts of former Kew Student Gardeners. I hope East London may also follow their example.

Equally gratifying to seeing the work of Kew men in South Africa, is to receive South African gardeners at Kew to complete their horticultural training. Two able South African gardeners have recently spent two or more years at Kew and I look forward to the continuance of the arrangement, which I feel sure will be of real value to horticultural work in the Union.

Research. During my interesting tour I was forcibly impressed with the many vital problems, both botanical and agricultural, which were awaiting solution, and by the fact that funds were lacking to enable the work to be undertaken. In our old Universities of Great Britain, and in other spheres, we are fortunate in our endowments bequeathed by pious benefactors, which are being devoted to Post-graduate Research in many branches of science. In South Africa, as in other Dominions and Colonies, no such opportunities exist for promising graduates, and scarcely any funds, other than those attached to definite posts or offices, are available for research work.

Bursaries, I understand, are given at times to students about to enter colleges or universities, but I venture to think that the money available would be far better spent if it could be devoted to the endowment of graduates who have shown an ability for carrying out research work. I should like to make an appeal to the Government of the Union and to all those in South Africa who have benefitted by the researches of others — in whatever direction it may be — to make adequate provision for the endowment of a member of Post-graduate Research Fellowships or Studentships to be held at the various university centres throughout the Union, so that the able men and women graduates, who are now being trained, may be able to carry out the research work in botany and agriculture and the ancillary subjects which is so pressing a need at the present time.

Royal Botanic Gardens,
Kew, England.

Flowering Plants of Garden Merit at Kirstenbosch.

By J. W. MATHEWS.

OF recent years the annual Ursinias have found great favour for bedding out in South Africa, as well as overseas. First *U. cakilifolia*, then *U. anethoides*, and this year *U. pulchra*, have received favourable notice, if not the "Award of Merit" of the Royal Horticultural Society. Such speak volumes for their horticultural value. Of their names there appears to be much confusion, both here and overseas. *U. pulchra* is not mentioned by Harvey in the Flora Capensis, nor its synonym *Sphenogyne speciosa*, although Nicholson gives it as introduced in 1836, "Native place unknown." I wonder if the *Sphenogyne speciosa* catalogued by some seedsmen at the present time is the old *U. pulchra*.

Ursinia pygmea

However, an equally favourable reception has been given to another Ursinia, *U. pygmea* from Namaqualand, where so many colourful annuals paint the landscape in seasons of plentiful rains. In the Gardens this season a large mass has been outstanding by reason of the brilliant orange of the flowers, and the freedom with which they were produced. It is one of the first to flower, and one of the last to pass over, its flowering period being through August, September, and October. Its habit is variable, from low and spreading to a rather widely globular plant 9 inches high and 12 inches wide. Selection will quickly secure a strain of the neat compact habit required for beds or borders. It will quickly find a place in every garden, being quite distinct from all the Ursinias as yet in cultivation. It is a true Ursinia, as distinct from the Sphenogynes of old. Sow in early March, and flower in a rich soil but not too light or loose a soil. Careful watering is required, too much inducing rather lax and long growth.

Aster elongatus

Another Composite of merit is the *Aster elongatus* from Saldanha Bay. So far it is the largest flowered species that has come into cultivation, and will find a place in every rockery of flowering plants, as distinct from succulents. It will also be effective in its season for a partially shaded corner of a dry-wall. Although a perennial, its flowering stems are mainly annual, and form a tuft 6 inches high and 9 or more wide. Sown in January, it will flower the first season in September and October. It is not sufficiently prolonged flowering for bedding out. The flowers are well over 2 inches across with the ray florets white, zoned reddish purple round the yellow disc. It is a tricoloured flower that would seem to be better named *A. tricolor*, one of Harvey's doubtful species. (*Agathea tricolor*, Ness. Ast. 267). (Perhaps a variety of *A. elongatus*). It certainly has all the distinguishing characters given in the Flora Capensis.

In that work there are six varieties given which are spread over a large area reaching from the Orange River to Albany and Somerset, yet the only one in the Gardens is from Saldanha.

A particularly fine seedling appeared in a batch raised a few years ago, and as it is breeding practically true, is probably a "mutant." It is practically a blue self with very little of the zoning, or none at all. It has the same habit as its parent, and is equally desirable for the same purpose.

A sandy soil with plenty of leaf mould is most suitable, although it will do well in any loose well-cultivated soil. It is probably partial to lime as it comes from kopjes in a lime-stone district. When well established it will withstand considerable drought, but under careful watering, and removal of all flowers as they fade, or a slight cutting back, I have no doubt a second crop of flowers could be secured. It must, however, have a decided period of rest during the summer, trimming the plants back about March, prior to new growth starting with the rains.

Wahlenbergias

Of the many South African "Harebells" few have come into cultivation. One perennial, *Wahlenbergia oxyphylla*, in its natural setting is a distinct and charming plant. Confined to crevices among large undulating masses of granite, it is a gem of 6 inches high and 9 inches wide. Under ordinary cultivation increased growth largely detracts from its appeal.

Among the annuals *W. annularis* is outstanding. The flowers are large for the genus, an inch across and deep, white ground charmingly banded and shaded blue. Leaves are basal, from which arise numerous flowering spikes making up an airy mass of bloom 12 inches high and 18 inches wide. Sown in March it is in full flower in October and November. A well drained porous soil is desirable, and careful watering is essential, as it dislikes a saturated soil. The very small seeds must be sown on a thin sandy surface of light soil, and not covered. A sprinkle of sand, to keep the seeds in place only, may be used. Protection from heavy rains is desirable, and overhead watering is detrimental.

Like many of the Namaqualand annuals in the Peninsula, this species will certainly prove most satisfactory as a summer flowering annual. From small trials made with limited amounts of seeds, there is little doubt left that many of them will find a permanent place in summer gardening, a small amount of attention then securing maximum results.

It is perhaps advisable to state that this plant is not the "perennial" *Wahlenbergia annularis* exhibited before the R.H.S., and given an Award of Merit. Our plant is certainly *W. annularis* of the Flora Capensis, and was collected very near Drège's locality for the species. It is widely distributed in Little Namaqualand.

Lobelia campanulata

The order Campanulaceae is represented in every garden of the world by the South African *Lobelia erinus*. Another species that will follow it round is *L. campanulata*, Syn. *Monopsis campanulata*. Its velvety blue-purple rotate flowers are very distinct from the Lobelia proper, and are produced over a long period. Sown in March it flowers freely in October, November, and December. Its habit is prostrate and diffuse, making a plant six inches high and 12 inches wide, or more according to conditions. Its cool restful effect will be appreciated in suitable surroundings. It is found along streamsides and in wet places, so a plentiful supply of water is required at all times. Any good soil rich in humus will suffice. It is an annual.

Zaluzianskya villosa

A "Scroph" of undoubted merit, *Zaluzianskya villosa* has for the first time made a display this season. Conditions in the Peninsula suit it, and it should become a favourite for early spring flowering from August to October. It is an annual, and when well grown will be a mass of bloom 9 inches high and 12 or more wide. It starts flowering as a seedling an inch or so high, and subsequent growth is practically made up of flowering spikes. The colour is variable from white to lilac, and lavender or pale blue, with an orange throat or eye. The flower is the usual five-lobed corolla, with bifid lobes giving it a starry outline. Apparently a sandy soil is essential as bigger and better plants are to be seen in the corn-lands of the Sand Veld than have been obtained so far in gardens.

As with all very minute seeds considerable care has to be taken not to smother them, or wash them about or out. If to be sown in ordinary nursery beds the soil should be flooded before preparation in order to obviate the need of watering before germination. It is equally necessary that the surface should be level, and finished off with a coat of sifted sand, and then smoothed over with a straight edged board. After sowing thinly the surface may be pressed down in the orthodox way. At least a week of fine weather can follow without watering, then a fine rose, or even a syringe properly used, will moisten the surface sufficiently. Practice has proved what observation suggested, that germination is best without the continual damping or watering that is so habitual, particularly with our native annuals.

Dimorphotheca spectabilis

The Transvaal *Dimorphotheca spectabilis* differs very much from our western prostrate and tufted species. It is a soft-wooded perennial sub-shrub with rather weak stems a foot or so long, and flower stalks 15 inches or more. The flower is over two inches across, and of a distinct ruby-port wine colour, clear and bright. It is almost perpetual flowering, seldom, even in our winter, being without flowers. Under rainfall only it is effective in November, but naturally falls into our summer flowering plants, where it is most outstanding. Not too rich a soil, and careful watering are required otherwise there is a nasty tendency to die off here and there. Propagation is readily effected by cuttings of the young shoots from the base, as in Pentstemons. As in all propagation selection from healthy free flowering plants is desirable. It is not a free seeder, as it is one of the species with a small disc, and perhaps imperfect flowers.

Double Chinkerinchees

To turn to bulbs for a change, a double white "Chink" has been most prolific and outstanding this season. It differs from the Double Chink that has been known so long, in the long spikes of rather close short stalked flowers, whereas the other has a globose or rounded head of flowers. Both are pure white, and the one under notice should be of considerable commercial value for export by reason of its freedom of flowering during November and December. The doubling is remarkable as all parts of the flower combine to make an elongating head of "petals" an inch long. Both are apparently double forms of the eastern *Ornithogalum thyrsoides*, which differs from our western form in appearance, and requirements. The western favours low lying ground often inundated during winter, but drying out during summer. The eastern appears to be a real streamside plant requiring water all the year round.

Natural increase is extremely prolific and exceptional. Increase may take place from the bulb, but if so it is entirely overshadowed by the production of bulbils from the leaves. (See Plate III). Production commences at maturity of the leaf, and continues during its drying up. When complete 20 or more can be counted on a single leaf, mainly produced from the clasping base, but also in strings along the upper portion.

Kirstenbosch,
December, 1931.

Propagation of Lachenalias by Leaf-Cuttings.

By HENRY H. COOK.

In the "Journal of the Botanical Society of South Africa," Part XVI, 1930, there appear two articles on the Lachenalia. One, most ably written by Miss W. F. Barker, gives a most interesting and very valuable account of its history and habitat, and accurate descriptions of the various species in the genus. The importance of this article, with the plates illustrating their characteristic features, will be appreciated most fully by all those whose love for the Lachenalia is deep. I am, in particular, deeply grateful to the writer for her very excellent article, a very fine contribution to our knowledge of the genus Lachenalia.

The very practical article by Mr. J. W. Mathews on page 13, will be most helpful to those who wish to take up the culture of these most charming bulbous plants in South Africa, for I can well imagine what a wonderful floral display these Lachenalias must make when massed in the open. When seen amidst natural surroundings, they are bound to create that feeling of delight and thankfulness that we get on occasions in this country, when we come across a well-placed colony of *Primula littoniana*, during July, in our rock gardens.

We are obliged, through climatic and unfavourable outdoor conditions, to grow the Lachenalia as a pot or basket plant entirely under glass, and the season is normally from February to May, though they may be brought into flower by Christmas by gentle forcing. With few exceptions, too, our stock is largely composed of hybrids, the exceptions being such species as *pallida*, *pendula*, *pustulata*, and *orchioides*, and these are by no means plentiful. The hybrid *L. Nelsonii* is one of the most commonly found in gardens. It is golden-yellow in colour, and lasts well in the cut state. I have some 50 or so hybrids varying in shades of colour from the clearest yellow to green, orange and maroon. For these hybrids we are indebted to such workers as Sir Frederick Moore and the Rev. Joseph Jacobs. These hybrids are expensive, ranging in price from 5/- to 30/- per dozen bulbs. Why this should be is difficult to understand, as, with a few exceptions, the Lachenalia is easily increased by natural "offsets"; and by leaf-cuttings. This latter method is not common. An article on this method was published in the Gardeners' Chronicle, on July 19th 1930, and, from the correspondence which I received, the method does not appear to be generally known.

Some few years ago I had charge of quite a good collection of hybrid Lachenalias, the flowers of which were frequently cut for house and table decoration. It was observed that any leaves which were inadvertently cut or broken off, and left on the moist, gravel-coated stage did not shrivel up, but remained in a fresh condition for a considerable time. On closer examination it was noticed that the leaves were endeavouring to heal over at the point of severance, not by an ordinary callus, but by means of a corky covering, and at that point were producing tiny bulblets. Nothing was done at that time to use the leaves as cuttings, because the stocks of bulbs were sufficiently large for our requirements.

Early in 1930, however, when preparations were being made for a small exhibit at the Chelsea (London) Flower Show of the various methods of vegetative propagation, some Lachenalia leaves were prepared and inserted as cuttings. These leaf-cuttings (half-a-dozen or more in five-inch pots filled with very sandy soil) were placed in the propagating house and kept moist and shaded from strong sunlight. In about a month the leaves were examined, and it was seen that at the base, on the upper surface of each leaf, numerous bulblets had formed. In some cases a row of them (eight to ten) had formed just above the corky cushion; while in others they were produced some distance up on the inside of the enfolding leaf. This development can be seen in the photograph. Plate III, fig. a. (The three top leaves are prepared for insertion as cuttings. Centre, leaves six weeks after insertion. Three clusters of bulbs, with offsets — the natural method of increase — on bottom right hand corner), and may prove of considerable interest to plant physiologists. These bulblets were in size about as large as Sweet Pea seeds, and a few of the largest produced flowers last April, when only a year old. They were again started into growth during August and, from the growth they are now making I feel certain they will all flower next April. This spring we inserted some flower stems as cuttings and they, too, formed two or three good-sized bulblets at the base.

Should these "leaf-cutting" bulblets be a success, we have an easy means of increasing the stock of a most useful, and charming spring flowering bulb.

University,
Reading, England.

Photo: H. H. Cook.

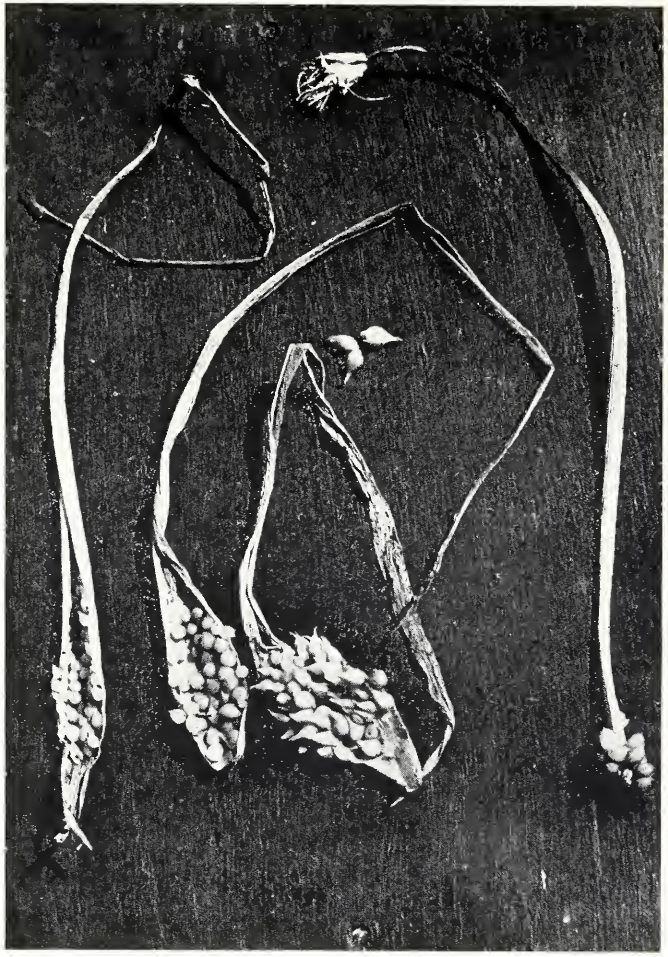

Photo: R. H. Compton.

PLATE III.

(a) Leaf Cuttings of Lachenalia.

(b) Bulbils of Ornithogalum.

Ixia.

By G. J. Lewis.

AMONG the many genera to be found in South Africa which do not grow wild elsewhere is the attractive genus Ixia, (or Calossie, as it is caressingly called in the field) belonging to the family *Iridaceae*. It undoubtedly ranks with the best known of our native plants in cultivation, both at home and abroad, and its commercial value has long been firmly established. To-day for a very small sum corms of certain of the commoner species and their hybrids are bought from endless supplies in Holland, and it remains for us to develop the other species to the same extent; so that, if any of them should become extinct in the natural state (which calamity may Heaven forbid!), there will at least be some memento of what used to flourish in this garden of flowers, our sunny South Africa.

For Ixias are easy to cultivate and multiply rapidly, and there is not one species of all the thirty-seven at present known to us that has not some particular charm of form and colour with which to grace a garden.

History

Let us look back to the earliest records available to get some idea of when the first of these plants flowered in northern lands. Probably we shall never discover the whole truth, but we do know that Philip Miller of the old Chelsea Physic Garden figured three species in 1757, in his "Icones." Now although Miller attached no special name to them—those were early days for binomials — he recognised the three distinct species and gave a brief description of each, so that there is some justification for regarding his work as the first monograph of the genus. Linnaeus who had established Ixia (deriving the name from an old Greek flower-name) as early as 1737 proceeded in the second edition of his Species Plantarum (1762-64) to give Miller's three Ixias the specific names they bear to-day, namely *I. polystachya* the much-branched white summer-flowering *Ixia*, *I. flexuosa* with pale pink flowers, and *I. maculata* the common orange one with the dark "eye." In 1783 one of Thunberg's pupils at the University of Upsala took *Ixia* as the subject of his dissertation; and in the last century we have first De Candolle's monograph and then Baker's in the Flora Capensis (1896-1897).

During the intervening 140 years between Miller's publication and that of Baker a number of new species were figured in the leading botanical works of the day both in England and on the Continent from living plants grown in the various botanical gardens. But in spite of all the excellent work that has been done for us overseas, much still remains to be accomplished before we can presume to say the genus *Ixia* has been thoroughly investigated. This work has been delayed too long; for the National Botanic Gardens have for years provided such facilities as could never have existed in South Africa before they were established. (During the month of October, for instance, as many as nine species flowered there, affording splendid opportunities for a close study of nearly allied forms). But there is abundant hope for the future now that the Bolus Herbarium with its accumulated records is on the spot for reference. We have to appeal to all those interested in the welfare of our flora to send plants of every *Ixia* growing in their district to Kirstenbosch so that the monograph already overdue may be as complete as we can make it. Even now *Ixia* is one of the six largest genera of *Iridaceae* in South Africa and it is impossible to say how many are still only known locally and whose characteristics have never been recorded.

Geographical Distribution

Ixia is an entirely South African genus found mostly in the South Western Region, the eastern limit being the Albany and Alexandria Divisions, and the one species found in these eastern districts is named *I. orientalis* on account of this. Two species have been found in the Karoo Region, *I. micrandra* from the Zwartberg Pass at an altitude of 5,600 feet where the flora, however, is similar to that of the mountains in the South Western districts, and a more stunted form of *I. incarnata* than the Ceres form from Karoopoort and Laingsburg, the latter at an altitude of about 3,000 feet, one plant being only six inches high. Little Namaqualand in the Western Region has one species a fairly sturdy plant (*I. namaquana*). An outlying station for the genus is in Hereroland where *Ixia Dinteri*, Schinz. occurs. With these few exceptions the genus is confined to the South Western Region, about seven species appearing in different parts of the Cape Peninsula. Probably only two species — *I. micrandra* and *I. incarnata* — thrive at a fairly high altitude, all the others preferring level country or the lower mountain slopes.

Description of the Plant

The plants are erect and vary within a range of one to four feet but the average height is from one-and-a-half to two-and-a-half feet. They give the impression of being anything but sturdy with their particularly slender stems, and in some species almost grass-like leaves, but they are actually sturdy enough with wiry stems which sway in the breeze and are capable of withstanding many a strong blast. There are one or two more robust-looking species such as *I. rochensis* with its broad, ensiform, ribbed leaf and another species in the Bolus Herbarium still awaiting more material from the veld before a name can be given to it.

Corm

Cormlets are present in some species (as many as forty being found clustered around the corm in the *Ixia* from Porterville illustrated under A) and afford a very satisfactory means for prolific vegetative production. The corms are not very large, averaging about three-quarters-of-an-inch in diameter and are covered with tunics whose matted fibres are of fairly firm or coarse texture, or in some species, such as *I. conica* and *I. leucantha*, the fibres are extremely fine and form a delicate, almost membranous covering.

Leaves

In all the species the leaves are linear and few, generally comprising the two short, basal, sheathing leaves, which are more or less withered before the two to four fully formed leaves are produced, and the one or two cauline leaves with a short free portion at the tip, but consisting mainly of the long sheathing part which strengthens the slender stem. In texture as well as in size the leaves differ. Some are grass-like with veins just visible, many have a firm, and others a coarse, texture with thickened margins and prominent, well-defined veins. Some are very short and exceedingly narrow as in *I. linearis*, *I. micrandra*, *I. orientalis* and a recently-described species, *I. Framesii;* then there are the longer and broader leaves, such as those of *I. patens* and *I. rochensis* which are ensiform, and finally very long, narrow leaves like those of *I. polystachya*. Except in garden forms the leaves very rarely exceed half an inch in width. *I. Vanzijliae* (k) is remarkable in having leaves with a crisped margin, giving the leaf the appearance of having been closely waved. The leaves are erect or sub-erect, with sometimes a half, or a whole, spiral twist. *I. incarnata* (f) differs from the others in having one leaf recurved in a sickle-shape and one sub-erect.

Inflorescence

The inflorescence consists either of the terminal spike or one, two (a), or as many as five branches may be developed successively below the main spike, thus ensuring a longer flowering period. The number of flowers in the terminal spike varies considerably, some having only one or two flowers and some as many as thirty. *Ixia viridiflora*, one of the most showy and beautiful is usually unbranched, but it has more flowers open together on one spike than any other species, as many as twenty in one spike having been recorded.

Flowers

Throughout the genus the perianth-segments are oval or oblong with a rounded apex and slightly narrowed basal portion, *I. angusta* a newly-described species, being the one exception. The bracts and bracteoles are comparatively small, membranous in texture, with greenish or reddish veining and persist without much change until the fruit is ripe. Those of *I. conica* are the most conspicuous. They are a reddish-brown colour and tend to shrivel and lose their form before the fruiting stage. The relative length of the

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EXPLANATION OF PLATE IV.

A. Euixia. C. Eurydice.
B. Morphixia. D. Hyalis.

a. *Ixia Rouxii*, Lewis, — Fig. 1, bract; 2, bracteole; 3, flower; 4, gynaecium.

b. *I. viridiflora*, Lam. — Fig. 1, bract; 2, bracteole; 3, flower.

c. *I. conica*, Salisb. — Fig. 1, bract; 2, bracteole; 3, flower; 4, upper part of gynaecium and androecium, bud.

d. *I. columellaris*, Ker. — Fig. 1, bract; 2, bracteole; 3, flower expanded; 4, flower closed; 5, perianth-tube, androecium and gynaecium; 6, upper part of leaf.

e. *I. speciosa*. Andr. — Flower laid open.

f. *I. incarnata*. Jacq. — Fig. 1, flower laid open.

g. *I. capillaris*, Thunb. — Fig. 1, bract; 2, bracteole; 3, flower; 4, flower laid open; 5, fruit; 6, seed.

h. *I. monadelpha*, Delaroche. — Fig. 1, bract; 2, bracteole; 3, flower; 4, androecium.

i. *I. curta*, Andr. — Fig. 1, bract; 2, bracteole; 3, flower; 4, androecium; 5, gynaecium.

j. *I. paniculata*, Delaroche. — Fig. 1, bract; 2, bracteole; 3, flower; 4, flower laid open; 5, stamen; 6, upper part of gynaecium.

k. *I. Vanzijliae*, L. Bolus. — leaf.

Del. G. J. Lewis.

PLATE IV. Ixia.

gynaeceum and androecium differs in many of the species. Frequently the style just reaches the top of the perianth-tube where the three stamens are inserted, then it seems to give enough of a twist to enable the style branches to alternate with the stamens and be fully exposed. In *I. viridiflora* the style branches are found lying flat on the limbs or curved down towards them. On the whole the filaments are short, less than the anthers, and in no case do the anthers reach the apex of the segments. In *I. viridiflora* the style branches are short and the anthers are long and very narrow. *I. micrandra*, a species with small, oblong anthers and exceedingly short filaments is exceptional in the genus. Occasionally the style is longer than the stamens and the style branches are spread out above the anthers. This can be seen sometimes in *I. incarnata*, *I. orientalis*, and most clearly in *I. speciosa*. Most commonly the style reaches to the top of the filaments and the style-branches alternate with the anthers (*I. conica*, *I. Stohriae*, *I. polystachya* and *I. flexuosa*.

Fruit

The fruit is a roundish capsule without any special mechanism for dispersing the seeds to a great distance. When ripe the capsule splits open from the top downwards and the seeds, rounded in shape to enable them to roll, are scattered around as the plant sways in the wind.

Classification. Euixia

It is, however, upon the characters of the flowers that the genus is sub-divided into four groups, the shape of the perianth-tube and limb being of great importance in classification. In all the species the tube is slender, at least in the basal part, but it varies in its manner of widening upwards and we get a type of flower suited to bee-pollination and another to butterflies or moths. The largest subgenus is EUIXIA or "Ixia Proper," which has a slender tube, usually less than an inch long, scarcely widening at all except perhaps just where the perianth-segments arrange themselves to form the bowl (A). The segments in this subgenus either have a dark, basal part (maculate) (A) or are concolorous (immaculate). In EUXIA the filaments are free to the base.

Eurydice

The united filaments are the outstanding feature of the next subgenus, EURYDICE (C). In all the other subgenera, however close they may be, even to touching one another, the filaments are never actually connate, and so we find this character was seized upon by one authority to form the new genus EURYDICE, now considered to be of subgeneric rank only. The name *monadelpha* given to the original species in this group means one-brothered and refers to the joined filaments. In *I. curta*, a fine species with gorgeous orange cup-shaped flowers having a reddish-brown centre, this character is still more fully accentuated and the filaments are united for their whole length.

A species which approaches *I. monadelpha* in several respects and which might be regarded as a connecting link between EUIXIA and EURYDICE is *I. columellaris*. Although the filaments are not actually united they are so close together that they give the appearance of being joined. Resemblances can be found in the flowers of these two species as well. The flowers of *I. monadelpha*, when fully open, are flat and star-shaped and the segments have three distinct bands of colour. There is the very dark centre or "eye," shading off into a lighter ring of the same or a different colour, the remainder of the segment being a still paler colour. In *I. columellaris* there are also these three colours, although the middle band of colour is not as wide or distinct as in the former. When fully open the perianth-segments of *I. columellaris* are recurved and the perianth-tube is slightly indented into the base of the segments, a feature which shows most clearly in the buds and which we have not observed in any other species.

Morphixia and Hyalis

The third subgenus, MORPHIXIA, has a perianth-tube which is dilated into a distinct funnel below the limb (B). The filaments are quite far apart when compared with those of the other three subgenera. For in the last subgenus, HYALIS (D), the three filaments and the style nearly fill up the entire entrance to the perianth-tube. Here too the perianth-tube is very much elongated (sometimes reaching three inches in *I. paniculata*). It is slightly widened in the upper portion and has star-spreading limbs.

Flowering-Period

Ixia micrandra begins to flower in July, probably the only species which does flower during the late winter. One or two species appear towards the end of August, more in September and an increasing number towards October. The summer-flowering species are found in November and December, after which, having brightened the earth for nearly half a year, they retire to rest. Broadly speaking the flowering-period of each species is short, being about a month.

No other genus in *Iridaceae* has so wide a range of colour as is to be found in *Ixia;* for which of the other genera can boast of having a green flower such as the

beautiful Tulbagh "Green Ixia" (*I. viridiflora*) with its purplish-coloured "eye." The colours range from pure white to white flushed with pink, and to pale rose and pale blue, then there are the cream, lemon, yellow and orange group; and finally the terra-cotta, old-rose and salmon pink, crimson lake, blood red, purplish-pink, lavenders and a deep purple, cool grey-blues and a brighter blue.

Some of the forms with a dark blotch at the base of the perianth-segments have a definite pattern, the dark and lighter colours being very prettily variegated. Some have a small "eye" of a deeper shade than the rest of the limb. Most often the "eye" is a purplish-black blotch, the paler "eyes" being either blueish, or some shade of brown, or mauve. In the *Ixia* illustrated (a) the segments are a very pale blue, and the "eye," the largest seen in any species, is a dark, velvety purple, almost black. *Ixia Metelerkampiae* has segments very prettily variegated towards the base — first with a purplish-red spot tapering off into a fine point along the mid-rib of the segment — and below this a paler area which is invaded by the purplish-red, jagged mark at the very base. *I. conica* has orange flowers with a relatively small purplish-brown blotch variegated with yellow in something of a star-shaped pattern at the centre. We have already remarked that three rings of colour are found in *I. monadelpha* and *I. columellaris*. An interesting feature of the MORPHIXIA group is the presence of well-marked veins in the flowers, somewhat in the nature of honey-guides, on the maculate segments. These are present in other species as well but not so clearly marked.

Very often flowers only appear at their best when fully open but this is not the case with the Ixia flowers for in a great many the buds and partially closed flowers are exceedingly beautiful because of the contrasting colours on the backs of the three outer segments which are frequently brighter than the upper surface. There is the common *Ixia maculata* found on the Cape Peninsula from October to November, which has orange flowers with a small brown "eye" on the upper surface and half of the lower surface a bright red. Another very beautiful flower is a variety of *I. speciosa* which has the lower surface of the outer perianth-segments a ruby red, the alternate inner segments and upper surface being white.

Essentially a sun-loving plant, most of the flowers close towards four in the afternoon, as soon as the sun has lost its heat, and remain closed on dull days. In the subgenus MORPHIXIA, however, the flowers are pendulous in some of the species, and do not appear to close at night or in dull weather. In the very long-tubed form the segments become erect and show their often bright-red under surface at the end of the day. A few of the flowers have a very faint, sweet scent. Nectar is present in very small quantities at the base of the perianth-tube.

Pollination

The flowers are protandrous. In buds about to open the androecium is fully developed and on the point of shedding pollen, while the stigmas are not fully expanded and not ready to receive pollen. As soon as the flower opens, however, the gynaecium enlarges very rapidly, the stigmas expanding and being covered with minute hairs which sometimes extend half-way down the style branches. In *I. micrandra* the style-branches are scarcely any wider at the tip while those of *I. paniculata* (j. 6) are very much expanded and deeply grooved. The pollinating agents are insects. In the case of the flat, bowl-shaped and cup-shaped flowers, several species of beetle have been observed in the National Botanic Gardens at Kirstenbosch. There are two members of the MELOIDAE family, *Ceroctis capensis* and *Cantharis lucida*, both known as "Blister Beetles." These are both very destructive, feeding on the fragrant flower limbs and on the stamens as well so that they probably do as much or more harm than good. More important are the "Monkey Beetles," members of the SCARABAEIDAE family, which eat the pollen and nectar and can be seen visiting one flower after another, the hairy back portion of the bodies covered with pollen. The long-tubed forms must be pollinated by a moth or butterfly having a long proboscis (a very long one indeed is needed for *I. paniculata!*) but we have not as yet been able to find the moth or butterfly specially adapted to this form of flower.

I have to express my acknowledgements to Mrs. Bolus, Curator of the Bolus Herbarium, for information and also for help in the preparation of the plate.

Bolus Herbarium,
Kirstenbosch,
November, 1931.

The Cultivation of Ixias.

By J. W. MATHEWS.

THE Ixias being native of the winter rainfall area present no great difficulties of cultivation in the Peninsula. *Ixia incarnata*, restored to specific rank by the Bolus Herbarium, extending into the warm Bokkeveld, and up to Klipfontein in Little Namaqualand, responds to the usual cultivation. *I. trichorhiza* extends from the Katberg, along the east to Natal, and will almost certainly be a summer growing species. It is not represented here. All are native to the coastal region, with the Western Province richest in number of species.

The flowering period starts in September with *I. incarnata* and *I. scariosa*, followed by *I. maculata*, *I. columellaris*, *I. monadelpha*, *I. speciosa*, *I. lutea*, *I. viridiflora*, etc., and finishes up with *I. polystachya*, *I. paniculata*, and *I. leucantha* in November.

The average height is 12 to 18 inches, with *I. viridiflora*, *I. polystachya*, and *I. leucantha*, up to 3 ft. under favourable conditions.

Considerable variation in colour is found in most species, particularly in *I. maculata*, *I. columellaris*, and *I. monadelpha*. The combination of lilacs, greens, and blues, in the last named being unusual, as well as the greens of *I. viridiflora*. In colour, and texture of flower and foliage, *I. speciosa* is a miniature of the Eastern Schizostylis. The small bell-flowered species are especially graceful as cut flowers, and reach a high phase of beauty in the "Clanwilliam Blue-bell," a deep coloured *I. incarnata*.

Although the actual period of flowering of each species is short, the slender stems, rich colours, or pendulous little bells, provide a variety in one or the other species, that make them most acceptable for decorative use.

A rich and friable sandy loam, well drained, will suit the majority of the species. Leafmould, well rotted manure, and bonemeal, may be used to improve the food supply. In practice, those species found in loose sandy soils are thrifty in a heavier soil provided it is well broken up, and left loose, not consolidated in any way.

Planting out should be done early in March, as soon as the soil is moist. If rains are delayed, it is of the greatest advantage to soak the soil, and get the planting finished without undue delay. When the plants are above ground the soil should be kept moist by hand or sprinkler up to the flowering stage. When the plants are growing freely a mulch of manure, or an occassional dressing of fertiliser, will be beneficial.

Plant the corms 3 inches under the surface for the majority, and 4 or 5 inches for the tall species mentioned above. In nursery beds we plant 2 inches apart in rows 6 inches apart. Strong corms for massing, space 4 or 5 inches apart to secure density of bloom.

Most species increase freely from offsets, which flower well in the second year. Seed is also produced freely, and if sown early in March, and kept growing as long as possible, will start flowering in the second season. After the second season the corms should be lifted, and spaced on prepared ground as for flowering corms, or may be used for massing, or in flower beds for spring flowering.

For spring-bedding they should only be used as dot-plants in combination with suitable spring flowering annuals, like Felicias, Heliophilas, Nemesias, Zaluzianskyas, etc., which will provide the main display, and the Ixias an accent of colour for a brief period.

Exceptions to the general requirements are found in *I. speciosa*, which requires partial shade, a moist situation, and an alluvial soil rich in humus. In *I. viridiflora*, *I. polystachya*, *I. leucantha*, and some forms of *I. maculata*, an abundance of water up to the flowering stage. Indeed, practically all species require a plentiful supply during growth.

Various species in dry, poor soils are subject to bad attacks of rust. Feeding and watering should be practised as soon as any loss of green is noticeable in the foliage. An occasional dressing of sulphate of potash alternating with nitrate of soda should restore them to a healthy appearance. If rust still appears spray with Bordeaux Mixture, or any other approved fungicide.

The early drying up of the foliage, mainly in the late flowering species, should not be confused with the effects of rust. It is a natural process more or less caused by dry conditions, aided by overcrowding in cultivation.

A well drained soil with a constant supply of water will largely nullify these defects.

Where the ground is required for summer use the corms can be lifted, dried in the shade, and stored in any open airy shed. Seedlings, however, should not be taken out until after the second season's growth is completed.

Kirstenbosch,
December, 1931.

OBITUARY.

RUDOLF MARLOTH.

By the death of Dr. Marloth in May 1931 South Africa loses one of her most distinguished adopted sons, and botanical science one of its most illustrious workers. The Botanical Society of South Africa in March 1926 conferred honorary Life Membership upon him in recognition of his signal services to South African Botany. He was the first recipient of that honour on the grounds of achievement, and the Society was itself honoured by his acceptance of it. It is fitting that some lines to his memory should now be included in the Society's Journal.

Though analytical chemist by profession Marloth was surely botanist at heart. Primarily a field botanist, he knew the Cape flora in the field as nobody else did. He was not the monographer who discriminates species and unravels the relationships of plant families in the dim recesses of a herbarium: indeed he was perhaps devoid of the requisite patience and attention to botanical bibliography that characterises the true systematist, and even his plant collecting was often disappointingly inadequate. But his interest and gusto for the rare and wonderful in plant life were infinite. It was the living plant that he studied, whether in the wild state or in his private botanic garden, and here his patience was indefatigable. Whether he was climbing a mountain before dawn for a particular photograph or striding across the karoo on his tireless limbs for some rare succulent: whether he was waiting for hours for a bird to visit a protea, or for years to correlate leaves with flowers in some Eriospermum: wherever it was a question of catching and holding live Nature at her most elusive, his energy and fixity of purpose were amazing.

The pages of his magnum opus, "The Flora of South Africa" teem with original observations — not the systematics of the herbarium, but the biology of the plant on the veld. Despite set-backs and troubles innumerable, he held to his purpose through two decades — the first volume was published in 1913 — and he did not die until he had corrected the final proofs of the last volume. His other great work "Das Kapland" is less well known, save to botanists; it reveals Marloth as an ecologist and student of vegetation when that branch of botany was in its infancy: it is truly a pioneer work, remarkable for the breadth and modernity of its outlook as well as for the range of knowledge it displays.

And in addition to these two noble works, Marloth published many shorter papers in South African and overseas scientific journals on subjects of vivid biological interest — on plant mimicry, on the spiders which inhabit the fly-catching species of Roridula, on many astonishingly modified succulent plants of our arid districts, on window plants, and on a subject of the most vital practical importance — the deposition of moisture from the south-east clouds upon our mountains.

One of his most remarkable features was his ubiquity. There was no corner of the Cape Province that he did not know. He was always just back from some outlandish spot or just going there. He was known everywhere, and one picked up his spoor, so to speak, in the most unlikely places: in fact the more off the track a place was, the greater the chance that he had been there. He gave freely of advice and information; in his company one learnt something and drew inspiration from him every minute: and yet he had a queer reticence. One was always conscious that his sleeves were stuffed with secrets, not to be revealed with undue haste. He was utterly an individualist — he would rather not be helped than run the risk of being hindered. He was in most people's minds the South African botanist par excellence, incredibly learned and yet surrounded by a kind of aura of simplicity and excitement which made of his lifework a very real and thrilling adventure.

R. H. C.

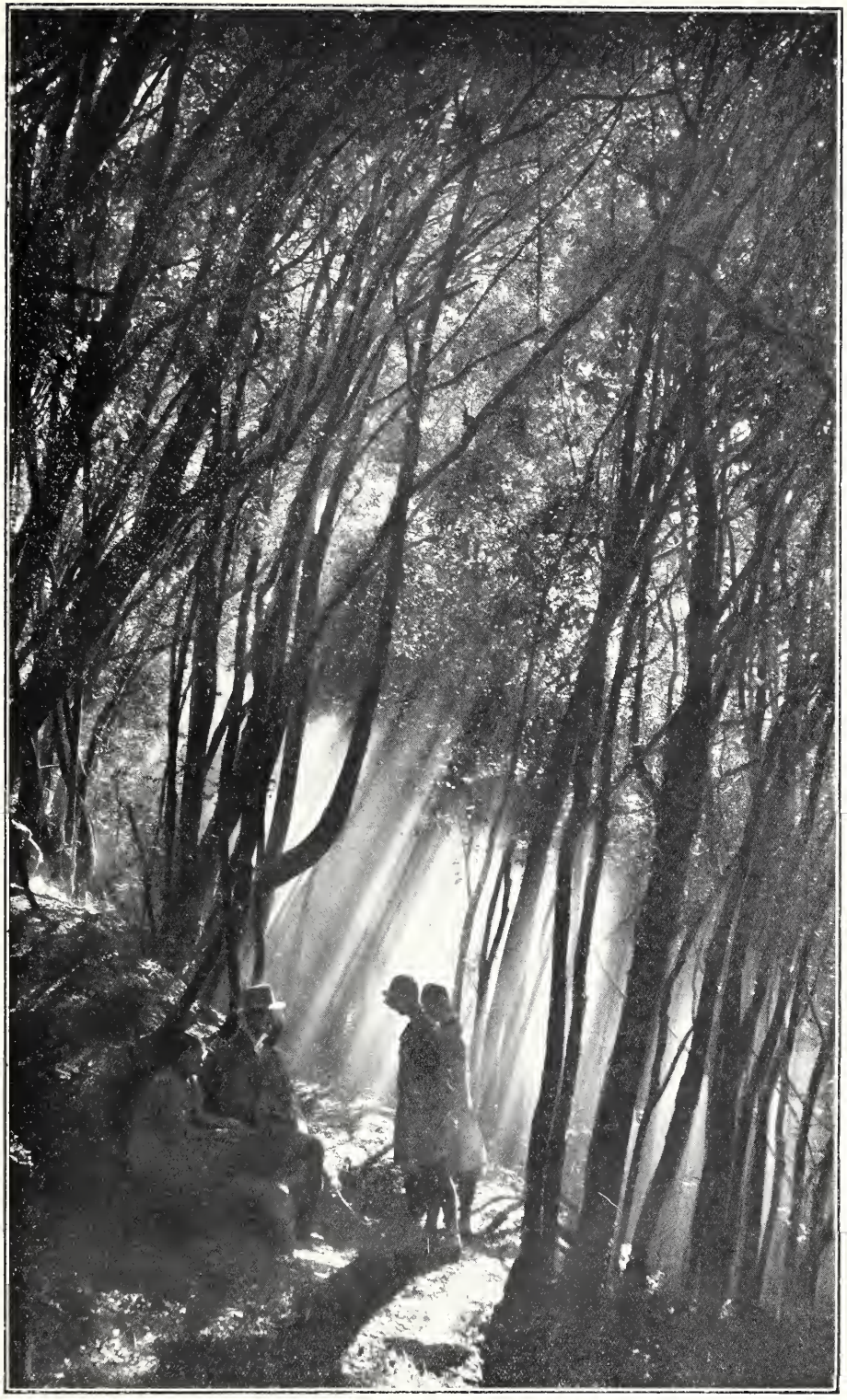

Photo: H. F. P. Middleton.

PLATE V. On the Kirstenbosch Contour Path.

(*Published by permission of Kodak (S.A.) Ltd.*)

Book Review.

"PLANT LIFE THROUGH THE AGES" by A. C. Seward, F.R.S., Cambridge University Press. 1931. 30/-.

THE history of the earth and its story during the time of formation of the rocks that make up its crust is a subject full of fascination. In the present volume the record of plant life is traced from the earliest rocks in which any fossil remains occur down to the present time.

The book is written not only for those with a knowledge of botany and geology but also for the general reader. Professor Seward, who is himself one of the world's authorities on fossil plants, has in this volume most successfully steered the middle course between the extremes of a purely popular account on the one hand, and a technical treatise on the other. He has produced a book at once full of interest to the layman and of great value to the specialist.

The introductory chapters deal in general terms with the geological history of the earth, its age, and with such questions as the preservation of plants as fossils and their interpretation. There is also a chapter devoted to an outline of the classification of plants. The main portion of the book treats of the vegetation of the various geological periods from the oldest to the present day.

In this account instead of wearying the reader with an immense load of detail, emphasis is laid on the nature of the material and on the evidence on which our knowledge of the conditions that existed in the different epochs is based. This evidence is drawn from a great variety of sources. Throughout references and comparisons are made with living plants and existing conditions.

The fossil floras of the whole world are considered and the evidence is marshalled in a truly judicial spirit. At no time is the account unduly swayed by adherence to any specific theory.

Mention may be made here of an excellent and unusual feature, namely landscapes with vegetation reconstructed from the fossil and geological evidence at different periods. There are nine of these drawn by Mr. E. Vulliamy.

Full references are given to the original descriptions and to works dealing with various aspects, so that the reader who is interested has the clue to a more detailed and complete knowledge than can be conveyed in a single volume. In reading the book compression or lack of detail are not aspects that obtrude. The enormous mass of material and the contributory evidence from very varied sources have been sifted and the essentials presented in a most attractive story that carries the reader along. He may often wish that he could have had more, but he cannot fail to be impressed by the great variety and width of research and knowledge that lies behind.

In the space available it is not possible to give any detailed account of the contents. The treatment of the different periods is somewhat varied, more space is devoted to the older rocks where the plant life was less like that existing at present, than to the more recent ones. The book is very fully illustrated. In addition to the reconstructions already noted, there are numbers of excellent photographs, both of fossil and living plants, and of landscapes that demonstrate various points. Especial mention may be made of the frontispiece, a view of the Franz Joseph glacier in New Zealand with tree ferns and subtropical vegetation in the foreground. There are also a number of maps showing the distribution of land and water at different epochs.

Professor Seward is to be congratulated on having produced an attractive and interesting volume of real value to the student. It is a volume that has been looked forward to for some years since it was promised in an earlier work. Now that it has been completed the realisation in no way detracts from the standard set by expectation.

R. S. A.

The Botanical Society of South Africa.

ANNUAL REPORT, 1930.

The Council has pleasure in submitting the Seventeenth Annual Report of the Society.

It is gratifying to record that in spite of adverse conditions owing to financial stringency, the Membership roll shews a very substantial increase over last year's figures.

MEMBERSHIP.—The Membership of the Society stands at:—

Life Members	71
Family Members	76
Ordinary Members	718
Associate Members	414
	1,279

which is an increase of 146 as compared with last year.

FINANCE.—As will be seen by the Balance Sheet and Revenue and Expenditure Account, the yearly contribution for the period under review to the National Botanic Gardens is the largest yet contributed from Membership fees after deducting working expenses and cost of Journal.

MEETINGS OF THE COUNCIL.—Four Meetings of Council were held during the year. At the Annual General Meeting held in April the following office bearers were elected:— *President*, the Rt. Hon. Sir James Rose-Innes, P.C., K.C.M.G.; *Vice-Presidents*, Sir Lionel Phillips, Bart.; Sir Max Michaelis; and J. B. Taylor, Esq.; *Members of Council*: Sir Drummond Chaplin, K.C.M.G.; Professor R. H. Compton; Professor R. S. Adamson; Lady Phillips; Mrs. F. Bolus; Miss E. Struben; Miss F. M. White; Mrs. Henry Burton; Miss D. Fairbridge; Dr. Lilian Robinson; Mrs. Carter; Wm. Duncan Baxter, Esq.; Major G. B. van Zyl, M.P.; W. de N. Lucas, Esq.; W. A. Eaton, Esq.; Dr. Bennie Hewat; H. C. Starke, Esq.; P. Ross Frames, Esq.; C. J. Sibbett, Esq.; F. E. Cartwright, Esq., *Hon. Secretary and Treasurer.*

Dr. A. W. Hill, C.M.G., F.R.S., Director of the Royal Botanic Gardens, Kew, visited the Union at the end of the year. He was entertained to Luncheon by the Botanical Society on November 13th, at the Hotel Assembly, Cape Town, and the President announced the conferment upon Dr. Hill of Honorary Life Membership of the Botanical Society. In an interview, Dr. Hill said: "In Kirstenbosch, you have one of the finest things of its kind to be found in any city or any country in the world. The Gardens deserve all the support that anyone in South Africa or elsewhere can give them. More funds are needed to make the most use of the Gardens and develop the scientific side of the work at Kirstenbosch. No country in the world has such a chance of developing useful and scientific work as you have here, and this work will be of value to the whole of South Africa."

The first set of six post cards of the Gardens, the initial cost of which was borne by Mr. J. B. Taylor, has been placed in the printers' hands. The Cards consist of reproductions of Water Colour Paintings of Kirstenbosch, by Mr. C. S. Groves and Miss D. Barclay. They will provide a very attractive Souvenir of the Gardens, and Members are urged to purchase them frequently as the nett proceeds will go towards building up a fund for the production of another series at a later date. It is anticipated they will be of great value as an advertising medium to Kirstenbosch.

During December the sixteenth volume of the Society's Journal was published under the Editorship of Professor Compton, Hon. Director of the National Botanic Gardens; the Journal continues to elicit praise from many parts of the botanical world and forms a very valuable part of the Society's operations besides being of great use in obtaining new members.

ANNUAL GATHERING.—The Annual Gathering of Members took place on Saturday, 4th October, many Members of the Society and their friends attending. The Gardens were looking very attractive with a brave show of Bulbous and other Flowers. Sir Lionel Phillips, Vice-President of the Society, addressed the gathering, and Professor Compton spoke on the general progress of the work at Kirstenbosch. Tea was served on the lawn, after which parties were conducted round the Gardens.

During the year the Gardens distributed to Members of the Botanical Society and to other Institutions 5,053 Plants, 5,073 Cuttings, 3,056 Bulbs, and 1,845 Packets of Seeds. It is evident that the privilege of receiving surplus material from Kirstenbosch is very much appreciated, and it is hoped that this may be reflected in a rapidly growing membership. Members are enabled to obtain seeds, etc., from Kirstenbosch which would otherwise be unprocurable. The Gardens do not enter into competition with the trade; on the other hand, the Gardens are very

largely responsible for the recent development of public interest in South African plants, as may be seen from seedsmen's catalogues, both in this country and overseas.

The Annual Report of the National Botanic Gardens for 1929 was distributed to Members in April.

The number of visitors recorded as entering the gates at Kirstenbosch on Saturday afternoons, Sundays and Public Holidays during 1930, was 45,896, or nearly 1,000 more than in 1929.

The total number of contributions to the Gardens during 1930 was 2,740 lots, this comprising 6,719 Plants, 1,973 Cuttings, 10,131 Bulbs, and 9,774 Packets Seeds. This represents an average of between eight and nine contributions for every working day of the year.

The Cape Peninsula Publicity Association, in conjunction with the Railway Publicity Department, have issued a brochure on Kirstenbosch (with photographs of other public Gardens in the Cape Peninsula). By the courtesy of these bodies, to whom the Botanical Society is greatly indebted, a copy of this Guide is being sent to Members and Associates of the Society. The Guide contains a new plan of the Gardens drawn by Miss F. R. Grant; photographs by Mr. A. R. van Oudtshoorn, and a text describing the history and principal features of Kirstenbosch.

The Council of the Botanical Society drew up a memorandum on the conservation of the native flora. This recommends, broadly speaking, that future legislation should aim at: (1) The total prohibition of the sale of indigenous flowers, plants, etc., taken from the wild. (2) Relaxation of the present restrictions on plucking by private individuals. (3) Encouragement of the cultivation of indigenous plants by growers licensed and inspected for the purpose.

It was proposed to co-operate with other Societies, etc., in laying the proposals before the Administrator.

THANKS.—The Council has to express its indebtedness and sincere thanks to Mr. R. L. McDonald, for having audited the Accounts, to the City Council for use of Rooms for Meetings, to Mr. C. S. Groves for Water Colour Paintings, to those who contributed articles in the Journal, and to the Press for their valuable assistance in reporting the affairs of the Society.

LIONEL PHILLIPS,
Chairman.

BALANCE SHEET AS AT 31st DECEMBER, 1930.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Life Members' Fund 1/1/30	305 0 0		S.A. Milling Co., Ltd., Deposit		
Added during year	50 0 0		on call	500 0 0	
		355 0 0	Accrued Interest	5 18 7	
Subscriptions paid in advance		58 13 0			505 18 7
Special Fund, Advertising Propaganda of			Union of South Africa, 5% Stock		
Kirstenbosch, donated by Mr. J. B. Taylor		50 0 0	1929/39 at cost	300 0 0	
Specialty Press of S.A.		107 3 5	Accrued Interest	4 7 1	
National Botanic Gardens, Kirstenbosch,					304 7 1
surplus for 1930		649 11 8	Cape of Good Hope Savings Bank,		
			plus interest		219 18 1
			Sundry Debtors for Advertisements		
			in Journal		26 19 6
			Cash at Bank		163 4 10
		£1,220 8 1			£1,220 8 1

REVENUE AND EXPENDITURE ACCOUNT FOR 12 MONTHS ENDED 31st DECEMBER, 1930.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Special Donation—Mr. H. Tevis, paid to			Special Donation by Mr. H. Tevis,		
Kirstenbosch		50 0 0	towards Rockery at Kirstenbosch		50 0 0
General Expenses		49 19 9	Subscriptions—		
Clerical Assistance		30 0 0	Ordinary	572 15 1	
Bank Charges		4 19 5	Family	130 2 0	
Stationery and Printing		11 15 1	Associate	89 19 6	
Entertainment Expenses		13 4 11			792 16 7
Annual Gathering at Kirstenbosch		12 6 8	Sale of Journals		0 11 0
Journal 1930 (less Advertisements)		55 13 7	Interest		32 1 6
Surplus for 1930		649 11 8	Donations		2 2 0
		£877 11 1			£877 11 1

Audited and found correct,
R. L. McDONALD, *Auditor.*
(Signed) LIONEL PHILLIPS, *Chairman.*

FRANK E. CARTWRIGHT,
Hon. Treasurer.

CAPE TOWN, 7th March, 1931.

List of Members of the Botanical Society.

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary, P.O. Box 267, Cape Town.

A.

Abbey, W.
ABBOTT, W. C.
Abercorn, Duke of
Abernethy, Miss O.
ADAMSON, PROF. R. S.
Ailsa, Marquis of
Ainslie, Miss F.
Ainsworth, Colonel J.
AKERMAN, CONRAD
Albrecht, C. W.
ALBU, SIR GEORGE, BART.
Alderson, Miss D.
Alexander, A.
Alexander, Miss E.
ALEXANDER, MRS. G.
ALI, H.H. PRINCE MOHAMED
ALICE, H.R.H. PRINCESS, COUNTESS OF ATHLONE.
Allison, J.
Allison, Mrs. J.
Allister, R.
Alston, Dr. J.
Alston, Mrs. J. A.
Anders, Dr. H.
Anderson, Mrs. A. Murdoch
Anderson, Mrs. C. L.
Anderson, Dr. C. T.
Anderson, E. B.
Anderson, Mrs. T.
Andersson, E. J.
Andersson, Mrs. E. J.
Appleyard, Mrs.
Apsey, T. J.
Arbuthnot, Miss I.
Archbell, Mrs. J. E.
Arderne, H. R.
Arkwright, Dr. J. A.
Armstrong, C. W.
Armstrong, Mrs. W. H.
Arnold, Dr. G.
Arnot, Miss
ASHTON, DR. M. L.
Askew, F.
Astrop, J. H.
Attwell, A. B.
Augustus, I. S.

B.

Babbs, A. T.
Babbs, Mrs. A. T.
Bacon, Lt. Col. A. D.
Backhouse, J. S.
Bahlcke, Miss W.
Baillie, Mrs. B. M.
Bain, W. G.
Bain, Mrs. W. G.
Bairnsfather, K. C.
Baker, Mrs. C.
Baker, Mrs. F. Watson
Balfour, A. P.
Ball, W. R.
Ballantine, Dr. A. J.
Banks, Mrs.
Barclay, Miss E.
Barker, Miss W.
Barlow, W.
Barnard, Prof. T. T.
Barnes, Mrs. G. A.
Barnes, Mrs. H. R.
Barnes, S. R.
Barr, P. R.
BARRETT, P. N.
Bartlett, Miss G.
Basson, Miss M. M.
Basson, N. J.
Bates, J. T.
Battenhausen, C. F.
Battenhausen, J. W.
Battenhausen, Mrs. J. W.
BAXTER, W. DUNCAN
BAXTER, MRS. W. DUNCAN
Bayley, Miss
Beale, O. C.
Bean, D.
Bean, H. E.
Beard, Miss H.
Beard, H. R.
Beard, Mrs. W. A. M.
Beattie, Sir J. C.
Beattie, Lady
Beck, Lt. Col. A. A.
Beck, Mrs. A. A.
Beck, F.
Beck, Lady Meiring
Beck, T. E.
Becker, Mrs. D.
Becker, T.
Bedford, H. J.
BEECROFT, E. E.
Beecroft, W. I.
Behr, C.
Bell, A. B.
Benjamin, Hon. Mr. Justice L. E.
Bennet, H.
Bennet, Mrs. H.
Bennett, A.
BENNING, A. F. J.
BENTINCK, VICE-ADMIRAL SIR RUDOLF
Bergh, Miss J. C.
Bernard, Mrs.
Berry, H. O. W.
Bertie, Hon. A. M.
Bertish, H.
Bertram, Mrs. M. E.
Beverley, Miss M.
Bevis, A. L.
Bingham, Mrs. H.
Bisset, W. M.
Blackbeard, Miss G. I.
Blackburn, H. W.
Blake, Mrs. A. S.
Blake, H. G.
Blakeney, J. M.
Blathwayt, Mrs. S.
BLEEK, MISS D. F.
Blenkins, Mrs. W.
Blohm, Rev. W.
Bloom, O. H.
Bock, Miss S.
BODDAM-WHETHAM, MRS. R. E.
BODEN, E. O.
Bohling, Mrs. E.
Bolton, E. J.
BOLUS, MRS. F.
Bolus, H. H.
Booth, Mrs. A. S.
Booth, C. O.
Borchards, Mrs. J. S.
Borlose, Mrs. E. A.
Bosman. Mrs. A.
Bosman, Mrs. I. D.
Bothner, C.
Bowen, W. M.
Bowie, Miss M.
Bowles, W.
Boxwell, Mrs.
Boyd, R. B.
Bradlow. Mrs. A. R.
BRAKHAN, A.
Brand, A. M.
Brandmuller, E.
Branford, F. W.
BRIMBLE, L. A.
Brink, A.
Britten, Miss L. L.
Broderip, E. F.
Broom, Mrs. A. H.
Broom, Mrs. M. B.
Brown, Professor A.
Brown, Mrs. M. G.
Brown, H. R.
Brown, J. R.
Brownlee, Lt. Col. J. Innes
Bruins-Lich, H.
Brydone, R. R.
Buchan-Hepburn, Sir A.
Buchan, Col. C. Forbes
Buckton, Mrs. F.
Buissinne, Mrs. W. T.
Bull, Rev. C. E. S.
Bullen, A. H.
Buller, A. C.
BULLEY, A. K.
Burdett, W.
Burkitt, Mrs. M.
Burleigh, R. F.
BURMEISTER, MRS. A. H.
Burns, A.
Burtt-Davy, Dr. J.
Burtt-Davy, Mrs.
Burton, Mrs. H.
Butcher, H. J.
BUTCHER, W.
Butler, W. B.
Butters, J. T.
Byng, Viscountess

C.

Cadman. Miss
Calderwood, Mrs. J.
Caldicott, Dr. W. A.
Callaghan, Miss B. G.
Campbell, Mrs. F. M.
Campbell, Miss K.
Campbell, Mrs. W.
Cape Natural History Club
Cape Peninsula Publicity Association
Cape Town Training College
Capes, Mrs. A. M.
Carter, Miss B.
Carter, Mrs. H.
Carter & Co., Geo.
Cartwright, F. E.
Cartwright. Mrs. F. E.
Cartwright, J. Stewart
Cartwright, Mrs. J. Stewart
Casalis, C. E. M.
Casalis, Mrs. C. E. M.
Casalis, Mrs. G. M.
CASE, MISS M. R.
Castle, F.
Cave, Miss E.
Centlivres, Mrs. F. v. d. S.
Chamberlain, Dr. C. J.
Chamberlain, Miss M.
Chamberlain, W. S.
Champness, Mrs.
Chandler, Miss C.
Chandler, Miss L.
Chaplin, Sir Drummond
Chappell, Sir Ernest
Chase, N. C.
Cheetham, Miss
Chisholm, D. B.
Christian, H. B.
Chubb, Dr. E.
Churchill, Senator the Hon. F. F.
Churchill, Mrs. F. F.
Cillie, Dr. G.
Cillie, Mrs. G.
Cilliers, Mrs. J. J.
City Tramways Co., Ltd.
Clare, T. C.
Clark, W. E.
Clark, Mrs. W. E.
Clarke, Mrs. C. J.
Clarke, E. D.
Clarke, Miss E. V.
Clarke, Miss F. E.
Clarke, H. C.
Clarke, J.
Clarke, Col. Stephenson R.
Clarkson, Mrs. C. F.
Clayton, Senator the Hon. W. F.
Cleaver, Sir Frederick
Cleghorn, Mrs. B. H.
Cloete, Miss C.
CLOETE, MRS. HENRY
Cloete, Mrs. P.
Close, J. E. P.
CLOSE, ADV. R. W.
Cloud, Mrs. J. W.
Cluver, P.
Cluver, Mrs. P.
Cochrane, C.
Crocker, H. C.
Coles, Rev. H. J.
Collegiate School for Girls, Port Elizabeth
Collingwood, Mrs. E. M.
Collyer, Miss F. H.

COLTON, MRS. W.
Compton, Prof. R. H.
Cook, Miss
Coombes, G.
Cooper, Mrs. M. B.
Cooper, Mrs. W. E.
Cooper, Mrs. W. N.
Copenhagen, Mrs. J. W.
Cornelius, W.
CORY, R.
Couldrey, Mrs.
Coulter, Mrs. G. H.
Coulter, Mrs. W. A.
Courtis, E.
Couser, W. T.
Cousins, Mrs. F.
Coutts, Mrs.
Coutts, Miss E.
Cowlisham, G. K.
CRAIG, J. W.
Crampton, Rev. W. Morley
Creswell, Mrs. F. H. P.
Crider, F. J.
Crittall, R. B.
Cunningham, C. M.
Currey, Hon. H. L.
Curlewis, Mr. Justice J. S.
CURREY, MISS M. H.
Curtis, H.
Cuthbert, Mrs. W.

D.

Dahlem Botanical Museum
Dale, D.
Dale, Miss E.
Dale, Mrs. H. R.
Dale, Miss V.
Dallas, Mrs.
DALRYMPLE, COLONEL
Dalrymple, G. H.
Dalziel, Major E.
Daneel, Dr. P. M.
Daniell, G. V.
Darke, Miss E. B.
Darter, Mrs. E. L.
Darter, G. B. Silver
Darter, Mrs. G.
DARTER, MRS. W. S.
Davies, M. L. de Waal
Davies, Mrs. E. G.
Davies, V. E.
Dawson, W. F.
Day, Miss M. J.
DEACON, MRS. J.
De Beer, Mrs. A. A.
De Jager, Miss I. G.
De Kock, Miss C. G.
De Kock, K.
De Lafont, Mme.
Delbridge, Miss
DE LINDT, DR. R.
De Mole & Kisch
Dent, Mrs. C. H.
Denton, W.
DE PASS, A. A.
De Villiers, Mrs. B.
De Villiers, Mrs. C. C.
De Villiers, Mrs. E. X.
De Villiers, Mrs. J. E.
De Villiers, Mrs. Jan. S.
DE VILLIERS, MRS. LOCHNER
De Villiers, Hon. Mr. Justice M.
De Villiers, Mrs. M.
De Villiers, Miss W.
DE VILLIERS, LORD
De Villiers Street School
De Wet, H. C.
De Wet, P. E.
De Wet, P. J. S.
Diamond, Mrs. F. W.
Diep River School
Diepraem, J. H.
Diggle, Major P. G. W.
Divine, Mrs.
Dobbertin, T.
Dobie, Mrs. R. W.
Dockrall, A. W.
Dockrall, Mrs. A. W.
Dockrall, T. A.
Dockrall, Mrs. T. A.
Dominican Convent High School, Rondebosch
Donaldson, Mrs. A. G.
Dorrien Smith, Major A. A.
DOSE, W. K.
Douglas, J.
Douslin, H. B.
Downes, Major H. M.
Dowson, Miss E.
Dreyer, Miss V.
Duff, Miss A.
Duff, J. A.
Dugmore, Miss H.
Duncan, G. A.
Duncan, T. H. M.
DUNN, MRS. A. A.
Dunn, Miss L. G.
Dunsdon, Miss M.
Du Plessis, Miss R.
Durban Corporation
Durham, J.
DUTHIE, MISS A. V.
Du Toit, Miss M. E.
Dyason, Mrs. E. C.
Dykes, W.

E.

Eales, Mrs. H. M.
Earle, Miss K. M.
EAST, MRS. H. F.
Eastman, A. E.
Eastman, Mrs. A. E.
Eastwood, Miss A.
Eaton, Miss M.
EATON, W. A.
Eccles, J. H.
ECKSTEIN, F.
Eddy, Miss D. M.
Edgar, Prof. C. S.
Edgar, Mrs. C. S.
Edmeston, Miss H.
Edwards, Miss G. E.
Edwards, Miss G.
Edwards, Mrs. H.
Edwards, H. C.
Eldred, H. W.
Elkin, Mrs. B.
Ellis, Mrs. M.
Ellerslie Girls' School,
Elsworth, J. F.
Elsworth, Mrs. J. F.
Engelenberg, Mrs. F. V.
Ensor, Mrs. B.
Erikssen, E.
Erydenberg, Mrs.
Ettmann, Rev. E. C.
Evans, Capt. D.
Evans, Hugh
Evans, Miss S.
Evcritt, W.
Eyetts, Miss L. B.
Eyles, F.

F.

Fairbairn, Mrs. F. W.
Falmouth, Viscountess
Favell, R. V.
Fearon, Mrs.
Featherstone, Mrs. H. C.
Felbert, T.
Ferguson, Mrs. E. W.
Finch, Miss B. A.
Finch, J. R.
Findlay, G. M.
Findlay, G. Stuart
Fisher, Miss M. L.
Fitzgerald, Captain A.
Fleischmann, Mrs. L.
Fletcher, Mrs. P.
Flugge-de Smidt, R. A. H.
Ford, Mrs. D. M.
Ford, Mrs. L. D.
Forest Department (7 conservancies)
Forsyth, A.
Fox, A. W.
Fox, F. R.
Foxwell, Mrs. A. D.
Fraser, J. B.
Friedlander, Mrs. A.
Froembling, Dr. W.
Frudd, H. W. D.
Fuller, Dr. E. B.
Fuller, Mrs. E. B.
Fuller, E. R.

G.

Gabbett, Mrs. P.
Gajana, Mrs. F.
Galpin, E. E.
Galpin, F. H.
Galsworthy, Mrs. J.
Galvin & Sales, Ltd.
Gamble, Miss A. A.
Gardiner, Hon. Mr. Justice
Garland, Miss M.
GARLICK, R. C.
Garnett, G. S. B.
Garnett, J. H.
Garnett, S. H.
Gavin, Major F. C.
Geddes, Dr. A. M.
Gemquand, Miss M. E.
Giffen, M. H.
Gill, Dr. L.
GILLETT, MRS. A. B.
Gilmore, Miss J.
Girls' High School, Pietermaritzburg.
Glennie, Mrs. E.
Glyn, L. C.
Godman, Dame Alice
Godman, Miss C. E.
Godman, Miss E. M.
GOHL, J. C.
Golding, Miss M.
Goldman, Mrs.
GOLDSCHMIDT, MRS. L. B.
Goldschmidt, Mrs. N.
Goodman, Mrs. Gwelo
Gordon, H. S.
Gowie, W. R.
GRAAFF, LADY JACOBUS
Graham, Lady
Graham, Miss E.
Grant, Mrs. A. J.
Grant, Dr. A. L.
Grant, Hon. Mrs. E. L.
Grant, Miss M. H.
Grant, Mrs. W. F.
GRAUMANN, SIR HARRY
Gray, L. G.
Grayson, E. N.
Green, Mrs. E. Goodwin
Green, Mrs. G. A. L.
GREENACRE, WALTER
GREY, LT-COL. C. H.
Grey, G. H.
Grey University College, Bloemfontein.
Grice, L. C.
Griffen, L. E.
Griffiths, Mrs. K. W.
Grobbelaar, J. J.
Groom, Miss D.
Grover, Major P. G.
Groves, C. S.
Groves, Mrs. C. S.
Guinness, Mrs. N.
Guthrie, F. A. C.
Guthrie, Miss L.

H.

Hackett, E. & W., Ltd.
Hadden, N. G.
Hall, Mrs. M. E.
Hall, Mrs. Vine
Hamilton, Mrs. D. A.
GANDY, MAJOR W. D. P. W.
Garabedian, Miss S.
HAMILTON, P. S. D.
Hampshire, Mrs.
Hanbury, Mrs. R. J.
Hands, Sir Harry
HARBORD, MR. & MRS. A. C.
Harsant, Mrs. J. W.
Harsant, Mrs. Sidney
Hardy, J. L.
Harris, Dr.
Harris, Mrs. C. C.
HARRIS, COL. SIR DAVID
Harris, Mrs. M.
Harris, Mrs. E. W.
Harris, Mrs. S. M.
Harrison, Mrs. M.
HART, MRS. N. M.
HARVEY, S. A.
Harvey, W. D.
Harvey, Miss
Haumann, J. S.
Hawke, W.
HAWLEY, MRS. G. W.
Hayes, Mrs. E. A.
Haymes, Mrs. M. C.
Hazell, Mrs. M. W.
Hazell, R. W.
Head, J.
Headfort, Marquis of
Heald, Major D. C.
Heenan, G.
Heil, Dr. Frank J.
Hellet, Mrs. M.
Henderson, Mrs. J.
Henderson, W. H.
Hennessy, Sir A. T.
Henshilwood, Miss N. G.
HENSHILWOOD, MRS. T.
Herbert, G. D.
Herklots, Dr. G. A. C.
Herman, Dr. C. L.
Herman, G. H.
Hermans, H. W.
Herrman, Mrs. L.
Herz, L.
Hewat, Dr. Bennie
Hewat, Mrs. M.
Heyman, Sir Melville
Heyne, F. W.
Heyneke, Mrs. P.
HEYNES MATHEW, LTD.
Heywood, Mrs. J. C.
Hilditch, C. H.
HILL, SIR ARTHUR (Honorary).
Hill, A. G.
Hill, H. C.
Hinings, H. E.
HIRSCHORN, F.
Hitchings, Rev. W. W.
Hitzeroth, L.
Hoare, C.
Hobson, J.

Hockly, D. E.
Hockley, R. A.
Hodenpyl, A. G.
Hoey, Mrs. C.
Hoey, H. G.
Hoffman, D. van V.
Hofmeyr, Mrs. C. J.
Hofmeyr, S. J.
Hogg, A. Gordon
Hoheisen, Mrs. A.
Holley, Mrs. Hunt
Holloway, H. M.
Holmes. Mrs. B.
Holmes à Court. Hon. Mrs. H.
Honey, Thos.
Hooper, H. C.
Hooper, V. E.
Hope Lodge Primary School
Hopkins, Mrs. M. F.
Hopkirk, Miss L.
Hopton, Miss D.
Horne, P. Stuart
Horner, F. C.
Hortor, W. E.
Hortors Ltd.
Horwood. Mrs. C.
Howard, P. J.
Howarth, Miss G. M.
Howorth, E.
Howorth, Mrs. E.
Howie, C.
Hudson, Miss
Hughes, Mrs. J. W. D.
Hugo, Dr. D. de V.
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(*b*) To augment the Government grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch.

(*c*) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

(*d*) To enlighten and instruct the members on botanical subjects by means of rambles, meetings, lectures and conferences, and by the distribution of literature.

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OF SOUTH AFRICA

Edited by R. H. COMPTON
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NATIONAL BOTANIC GARDENS

Part XVIII. 1932.

KIRSTENBOSCH,
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SOUTH AFRICA.

Published under the authority of the Council of the Botanical Society.

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Flowering Plants and Ferns

of the

Transvaal with Swaziland,

South Africa.

By

JOSEPH BURTT DAVY, M.A. (Oxon), Ph.D. (Cantab), F.L.S., F.R.G.S., F.R.S.S.Af.

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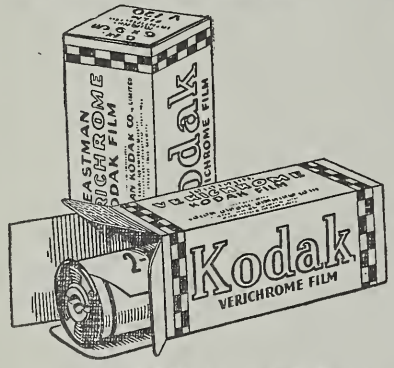

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PLATE I. Lithops Lesliei.

The Journal of the Botanical Society of South Africa.

EDITED BY R. H. COMPTON.

PART XVIII 1932

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Stapelia Schinzii: blow-flies visiting the flower (*Photo*: R. H. Compton) .. .. Plate IV.

News and Notes.

THE Annual Report of the Botanical Society for 1931 is printed on a later page. Attention may be called to the further increase in membership of the Society. The following table shows the steady way in which the Society has grown since its foundation, irrespective of booms and depressions.

	Life.	Family.	Ordinary.	Associate.	Total.
1914	33	22	264	33	352
1915	46	26	263	32	367
1916	49	26	264	45	384
1917	46	24	249	53	362
1918	49	28	281	78	436
1919	50	38	320	84	492
1920	54	45	384	237	720
1921	54	48	407	287	795
1922	55	52	418	301	826
1923	59	50	405	269	783
1924	62	57	455	313	887
1925	62	58	462	330	912
1926	65	60	481	341	947
1927	68	60	522	353	1003
1928	66	54	581	345	1046
1929	69	57	625	382	1133
1930	71	76	718	414	1279
1931	73	77	753	437	1340

The results have been that the Society has given increasing support to the work at Kirstenbosch — the grant towards maintenance in 1932 was again a record, namely £783 2s 3d., this being the balance on the 1931 account, as compared with £649 11s. 8d. in the previous year, — and moreover the Society has achieved a greater influence in matters connected with the South African flora. The other side of the picture is that Kirstenbosch has been able to render increasing assistance to members of the Botanical Society, by dividing with them some of the tangible results of the Gardens' work in the form of seeds, etc., of South African plants. The number of members sharing in this distribution and the actual amount of material sent out show a considerable increase in recent years. Incidentally, this distribution involves increased work for the staff of the Gardens, increased postage and other expenses: and we should like to suggest that members when applying for the seeds (to which they are entitled, and which it is a pleasure to send), should at the same time send in the names of new members who may also share in the benefits of the Society, and who will help to swell the funds available for the Gardens.

* * * * * *

The construction of the rock-work, paths, etc., in the first section of the Succulent Garden was carried out by means of a grant from the Life Members' Fund of the Botanical Society. Extensions have become necessary, and the Council of the Society has made a further grant of £200 to enable another section of the Garden to be constructed. This work is now well advanced, and is linking the Succulent Garden with the end of the Horse-shoe Path and the area which was the original Nursery when the Gardens were founded. This latter area has also been permanently laid out with paths, steps, water supply, storm-water-drainage, etc. Practically the whole of the ground within the loop of the Horse-shoe Path, including the Dell and the Cycad Amphitheatre, has now been brought to its final shape.

* * * * * *

This construction work around the Dell has almost exhausted the whole of the funds available for construction work. It will be remembered that the greater part of this was derived from a bequest by the late Dr. de Korte. It is highly important that this fund should be replenished so that the Trustees may have the means of carrying out the many other pieces of development and improvement that the Gardens require. The Director will be glad to discuss with prospective benefactors the various projects for the growth of Kirstenbosch for which funds are necessary.

* * * * * *

The Annual At Home of the Botanical Society took place at Kirstenbosch on Tuesday, 18th October, in delightful weather, a large number of Members and their

friends attending. Tea was served on the Lawn by the lessee of the Tea House, and speeches were made by Mr. W. Duncan Baxter and Professor Compton. Members had an opportunity of seeing work in actual progress in the extension of the Succulent Garden. This was the first occasion in which the At Home has been held on a day other than Saturday, and the experiment was so successful that it will probably be repeated in future years.

* * * * * *

Mr. J. W. Mathews, Curator of Kirstenbosch, has been awarded the Associateship of Honour of the Royal Horticultural Society.

* * * * * *

Respectful congratulations are offered to Dr. N. E. Brown on the Honorary Degree of Doctor of Science which has recently been conferred upon him by the University of the Witwatersrand, in recognition of his work on the South African flora. Dr. Brown's contributions to South African systematic botany are outstanding in quantity and quality, and extend over a very long period, both on the staff of the Kew Herbarium and in retirement. No authority carries greater weight than that of Dr. Brown by reason of the scrupulous care of his work, his vast experience and his possession of those powers of trained intuition which are so essential in systematic botany.

* * * * * *

The value of the Nature Study work for school children which is carried on at Kirstenbosch needs, or should need, no emphasis. During the absence of Miss Letitia Starke on leave overseas Miss Muriel Johns has taken over the work. Miss Starke is now returning to the Cape, and will resume her duties next school year. The numbers of children from the local schools attending the classes are so large that it is most desirable that an assistant to Miss Starke should be appointed. Moreover, each individual child, under the present arrangement, only comes to Kirstenbosch once a term: valuable as even this glimpse of nature is, it is obviously quite an inadequate amount to set against the indoor work with blackboard, exercise-book and the like which the child gets in such full measure.

The Edward Muspratt Solly Scholarship has been held during 1932 by Miss G. J. Lewis, B.A., formerly of Herschel School and the University of Cape Town. Miss Lewis has been carrying out various pieces of research and systematic work in the Bolus Herbarium in connexion with the Gardens. An article by her on the genus Ixia was published in last year's Journal. Miss Lewis has been reappointed to the Scholarship for a second year in terms of the regulations.

* * * * * *

Dr. John Muir, the well-known botanist of Riversdale, contributes an article on a subject of almost romantic interest — the seeds and fruits produced by plants in distant countries, which by the accidents of wind, weather and current drift up on South African beaches. Some of these ocean waifs are still capable of germinating after journeys of thousands of miles and months or years. This living flotsam is thought to be the means whereby the shores of isolated islands have been colonised by various kinds of plants. The identifications of these stray seeds, far from their origin which is unknown and gives no clue to their identity, is a matter of great difficulty. Few people realise the existence of these far-borne seeds in our sea-shore drift, and some readers on sea-side holidays may be attracted by the charm and thrill of finding them. Dr. Muir would be very glad to see any specimens that may be found, and to give name and locality when possible.

* * * * * *

Mr. Mathews contributes an article on some of the noteworthy flowering South African shrubs grown at Kirstenbosch — the Leucospermums, Greyias and Brunias — which deserve a place in every garden big enough to grow at least one shrub! No finer or more satisfactory flowering shrubs exist than some of the Leucospermums, and contrary to the opinions of some, they are not difficult to grow, at least in the coastal districts, though germination is sometimes delayed. A correspondent in Australia sends a list of 21 different species of Protea and several Leucadendrons, Leucospermums, Aulax and Serruria, which he has raised in his garden — mostly from seed sent him by Kirstenbosch as a member of the Botanical Society. And what can be done with South African Proteaceae in Australia can surely be done in South Africa.

As the native flora of South Africa dwindles, so the popular feeling in favour of its preservation increases. The Botanical Society has taken an active part in the movement for practical means of stopping the destruction that is going on. It prepared the memorandum embodying the principle of prohibition of sale of all indigenous flora gathered in the wild state with certain locally determined exceptions, which has had considerable influence with the responsible authorities. The Provincial and Divisional Councils are aware of the danger as never before. The Administrator of the Cape Province, Mr. Conradie, in his address to the Divisional Councils Congress last month said: "If the Congress would request him more or less unanimously to consider legislation for protection of wild flower reserves where municipalities or divisional councils wished to establish them, and/or if they would strongly urge him to introduce legislation to prohibit the sale or picking of wild flowers for definite periods in certain districts on receipt of proof that the divisional councils concerned had passed resolutions to this effect, he would be only too pleased to assist in the matter." So the duty is laid on the various districts and above all on the farmers, who have now the opportunity of combining to preserve the floral wealth of their own farms and their own districts from commercial exploitation and pilfering. Individual farmers can do much on their own land to preserve the flora, by setting aside portions as wild flower reserves and by excluding the flower pickers: and farmers acting in co-operation in their districts can secure legal protection from the Administrator on the lines he has laid down.

* * * * * *

The Botanical Society has advocated the establishment of national parks and of smaller local nature reserves for the protection of native flora, fauna and scenery. An article on a later page will show what progress has been made in some of the country districts and towns, especially in the Cape Province, in putting this into practice. The recent South African National Publicity Conference at Lourenço Marques unanimously passed the following resolution:

"In view of the ever-increasing interest in the South African flora especially in succulent and bulbous plants by visitors from overseas, particularly from America, Great Britain and Germany —

(a) This Conference urges all Municipalities, Divisional Councils and similar public bodies to set aside protected areas suitable for nature reserves so that our overseas visitors may the more easily obtain a first-hand knowledge of our unique flora.

(b) This Conference again enjoins Municipalities and Divisional Councils, Publicity Associations, Nature Study Societies, School Boards, etc., to do their utmost to see that existing legislation for the protection of our flora is made effective and every help given to assist the police authorities in carrying out existing ordinances dealing with Wild Flower Protection.

(c) And Publicity Associations be pressed to give more prominence in their literature to the flora in their respective districts, thereby creating further attractions to visitors."

This has already borne fruit in the action taken, for instance, by the Port Elizabeth City Council. It must be realised that nature protection is not only a national matter; it is a local matter also, and one in which every local authority has its own particular responsibility and opportunity.

* * * * * *

The discovery of a new locality for *Welwitschia mirabilis* is an event of great botanical and general interest. Mr. P. S. Louw of Swakopmund writes in the Diamond Fields Advertiser of such a discovery in South West Africa, mentioning that the plant probably occurs over about 2,500 square miles of country. In correspondence, Mr. Louw gives further particulars which substantiate his claim that a huge new locality has been found. It is, he says, "very broken and almost inaccessible country, entirely different from the hitherto known habitat of the plant in the surrounding Namib Desert at Haigamchab and Welwitsch, where the few specimens straggle in a very poor and withered condition as compared with the thriving and green appearance of this *densely* "populated" new area. There is no reason to fear that the Welwitschia in the new tract will die out. The plants are in a wonderfully thriving and green condition. The decomposed old granite formation in most parts and the schist in others, seem to furnish just the right proportion of nourishing soil that tends to their well-being. Where the plants grow on lower levels, as at Haigamchab and elsewhere, not only do the continually shifting sands militate against their existence, by in my opinion the deadly mica dust carried by these sands is very likely the chief cause of their slow extermination."

The HAROLD PEARSON MEMORIAL HOSTEL provides accommodation for those who wish to undertake private work in botanical and other natural history subjects at Kirstenbosch. For particulars apply to the Director.

* * * * * *

Botanical Specimens intended for cultivation at Kirstenbosch or Whitehill may be sent free of charge by rail or post from places within the Union, South West Africa and Southern Rhodesia, if addressed to the Director. Printed labels and information on request.

* * * * * *

Erratum: Journal, Part XVII, 1931. Page 9, column 2, line 22. For *member* read *number*.

The Beach Drift of South Africa.

By DR. JOHN MUIR.

BY beach drift is understood the refuse cast up by the sea and stranded on all the shores of the world. It contains many seeds — the seed drift — which originates (1) from plants in the vegetation of sand, rocks, or salt marshes in the vicinity; (2) from plants on the inland banks of neighbouring rivers; and (3) from alien sources. The term " seed " signifies the unit of dispersal, including fruits and any part thereof.

Factors.

Of the methods of seed-dispersal we are here chiefly concerned with ocean-currents. The east coast of Africa from the equator downwards receives tropical drift from Malaya and N.W. Australia by way of the South Equatorial current which passes either north of Madagascar carrying seeds to the region of Zanzibar, or south of it to our own shores by way of the Moçambique and Agulhas currents. Drift from W. Australia may also be brought within the influence of the South Equatorial by the W. Australian current. The west coast of South Africa receives drift from tropical Brazil, extra-tropical South America and Fuegia via the Brazilian, South Atlantic Connecting and Benguela currents. The discovery of a drift-seed of *Mucuna gigantea* at Lambert's Bay seems to prove that the small branch of the Agulhas current which flows round Cape Point is capable of seed-dispersal. South Africa can supply certain seeds, enumerated later, to the South Australian coasts via the West Wind Drift.

The local currents and insets on the South African coast exert local, para-continental influences on seed-dispersal.

The parts played by floating logs, pumice and corals in oceanic seed-transport have been considered by the writer elsewhere. The earliest South African reference to pumice seems to be by Mentzel between 1733 and 1741 from Table Bay. Samples collected at Riversdale agree partly with material from Kerguelen, and partly with that from Krakatau. Large masses of buoyant maeandrine madrepore of foreign origin, which could carry small seeds, have been picked up near the Gouritz River.

Historical.

The oldest, but indirect, reference in South African literature which the writer could find is by Kolbe (who was here between 1705 and 1713), as compared with 1570 the earliest European date: in both cases probably *Entada gigas* is intended. Beyond a few others in the Challenger Reports there is practically nothing. The folk lore of these alien " sea-beans," scanty here but extensive in Europe, has been dealt with elsewhere by the writer.

The traverse of the ocean made by the floating seed may be short, e.g. from Madagascar; or longer, e.g. from Mauritius (1,500 miles), from the Keelings, Malaya and N.W. Australia (3,900-4,500 miles), even these being minimum, and not the actual distances followed by the currents. The journey from Malaya to East Africa may take up to eight months. A derelict has covered less than half the distance from Madagascar in seven weeks.

The South African Beach Drift at various Stations.

The seed-drift of the Riversdale coast, 34.27 Lat. S. and 21.20 Long. E., is more of the type found in temperate latitudes. Seeds are numerous, those of local origin including *Ricinus communis*, mericarps of *Hebenstreitia cordata*, " stones " of *Olea spp.*, winged fruits of *Zygophyllum Morgsana*, marginal fruits of *Osteospermum moniliferum*, *Passerina rigida*, *Noltia africana* (the seeds

remarkably like *Colubrina asiatica*), *Sideroxylon inerme*, *Acacia saligna*, *A. Karroo*, capsules or seeds of *Antheri-cum revolutum* and many others. All are small and none except the classic *Scaevola Plumieri* is dispersed by currents. The stones of cultivated fruits are common, but occasional Brazil and Barcelona nuts or a mango stone are the jetsam of coastwise shipping. Arriving from sources further eastward are seeds of *Ipomoea Pes-caprae* (the few miserable plants at Riversdale do not produce seed), *Cassytha filiformis*, broken pods of *Cassia fistula*, seeds of *Canavalia obtusifolia*, *C. bonariensis*, *Entada gigas*, *Caesalpinia crista*, all spread by currents. Possessing slight buoyancy which may operate along rivers we find in the drift also fruits of *Podocarpus falcata*, fruits (here dead) of *Cryptocarya latifolia*, underground tuberous growths of *Rhoicissus Thunbergii*, bulbils of *Oxalis cernua*, and others unidentified. These determinations, simple as they appear, have taken a long time. Lastly there are seeds, mostly large, of alien origin, e.g. *Afzelia bijuga*, *Dioclea reflexa*, *Sophora tomentosa*, *Mucuna gigantea*, *Mucuna spp.*, *Strongylodon ruber*, *Barringtonia speciosa*, *Cocos nucifera*, etc.

On beaches near East London, 33.01 Lat. S. and 27.54 Long. E., in addition to most of the preceding were found seeds of *Calonyction Bona-nox* which is cultivated locally and has extremely buoyant seeds; *Vigna marina* also current-borne; *Mimusops obovata* (not current-borne), and others with slight buoyancy; viz. *Coix lachryma-Jobii*, *Calodendron capense*, bulbils of *Acidanthera brevicollis*, tubers of a possibly undescribed *Asparagus*, bits of stems and fruits of *Salsola Kali*, etc., all of local origin.

Near Lourenço Marques, 22.58 Lat. S. and 22.36 Long. E., the picture of the seed-drift approaches that of tropical East Africa and the Indian Ocean littoral, firstly by its botanical composition and the size, high buoyancy and nature of the seeds, secondly by their greater absolute quantity although not perhaps by the number of species represented, thirdly by the parent trees and other plants growing in the neighbourhood, and lastly by many being river bank species from the immediate hinterland. Most striking of all were the enormous current-dispersed woody seeds and capsular quadrants of *Xylocarpus moluccensis* which the writer had seen in 1899. A totally unexpected and unrecorded find were growing trees in fruit in the mangrove of *X. obovatus*. The following were common and current-borne:— fruits of *Barringtonia racemosa*, hypocotyls of *Ceriops candolleana*, *Rhizophora mucronata*, *Bruguiera gymnorhiza*, seedlings of *Avicennia officinalis*, seeds of *Scaevola Plumieri*, *Ipomoea Pes-caprae*, *Canavalia obtusifolia* and legumes of *Derris uliginosa*. *Caesalpinia crista* grows near the Rio do Espirito Santo, and *Entada gigas* along the Incomati River, where the discovery of *Mucuna gigantea* in flower and seed proved that it was identical with *M. quadrialata*: all have highly buoyant seeds, the last named common everywhere in our beach drift, and that of the Indian Ocean generally. *Terminalia katappa*, current-dispersed, is cultivated. In the drift but of little importance from our standpoint occur also *Dialium Schlechteri*, *Trapa bispinosa*, *Arachis hypogaea*, *Anacardium occidentale*, *Mangifera indica* and *Pretraea zanguebarica*.

On the west coast of South Africa buoyant seeds of local origin are practically unknown in the beach-drift. The writer obtained seeds of *Entada*, *Caesalpinia*, *Mucuna gigantea*, *Strongylodon ruber* and *Dioclea reflexa*.

The generalisations that seed-dispersal by ocean currents is mainly restricted to warm latitudes, that there is on the whole little effective dispersal by this means in temperate regions, and that there is in the tropical regions a greater abundance of stranded local seeds are exemplified here in more or less degree. The South African beach-drift has affinities with both classes. On the Riversdale and south coast the number of plants with buoyant seeds is actually less than on the south coast of England. The tropical alien drift at Riversdale in size, quantity and variety is infinitely greater than in most representative temperate zones.

EXPLANATION OF PLATE II.

SOUTH AFRICAN DRIFT-SEEDS.

PLATE II.

745, *Entada gigas* (the "sea-bean"): 238, *Mucuna sp.*; 733, *Dioclea javanica* (= *D. reflexa*), brown to black, unspotted: 721, 774, *D. reflexa*, a form, reddish ground, black spotted: 751, 722, *Strongylodon ruber*, nearly or quite black, nearly globular: 771, *Afzelia bijuga*: 764, *Mucuna gigantea*: 247, *Mucuna* or *Dioclea*: 7, *Mucuna sp.*: 504, *Mucuna sp.*: 741, *Caesalpinia crista* (the "knikker."): 677, *Derris uliginosa*. pod: 776, *Terminalia katappa*: 775, *Aleurites triloba* (the "candle nut"): 10, 533, *Canavalia bonariensis*: 663, 674, *C. obtusifolia*: 641, *Sophora tomentosa*: 537, 538, *Convolvulaceae*, probably one of the larger buoyant species: 777, *Ipomoea Pes-caprae*: 778, *Calonyction* (*Ipomoea*) *Bona-nox*: 781, *Hibiscus tiliaceus*: 779, *Thespesia populnea*: 4,337, *Scaevola Plumieri* (= *S. Thunbergii*). (All were collected by the writer).

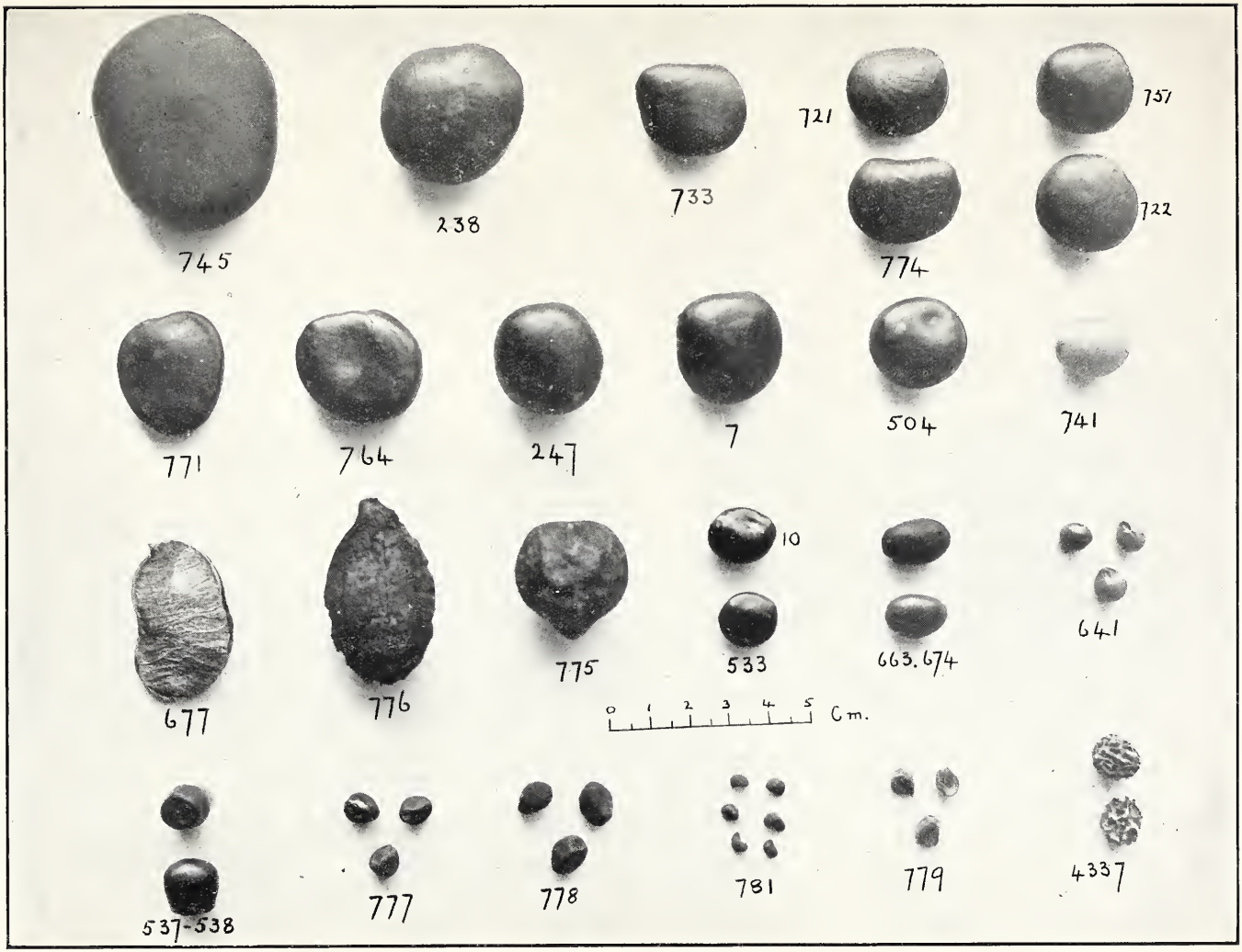

Photo: J. Muir.

PLATE II. Beach Drift Seeds and Fruits.

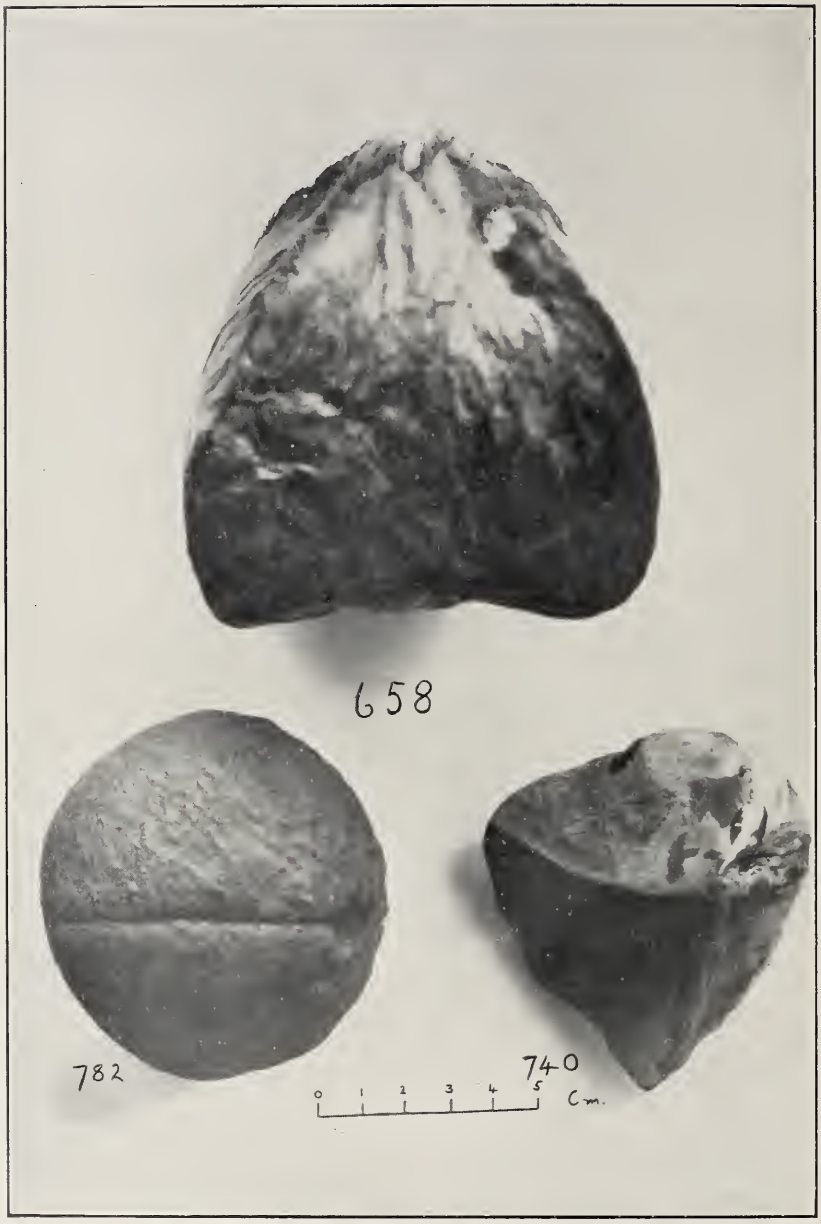

Photo: J. Muir.

PLATE III. Beach Drift Fruits.

South African Plants Current-dispersed.

A fairly complete list, omitting *Gramineae* and nearly all *Cyperaceae*, but somewhat swollen by including species from N. Zululand and Lourenço Marques, which are, however, within the limits of the *Flora Capensis*, is given herewith. The classification is that of Schimper, followed by Guppy, which is adopted in this paper as it will assist readers so far interested as to try to identify seeds they may pick up.

I.—Floating power due to unoccupied space inside seed or fruit.

1. Where the seed is concerned.
   a. *Hibiscus tiliaceus*, *H. diversifolius*, *Thespesia populnea*, *Colubrina asiatica*, *Dodonaea viscosa*, *Calonyction Bona-nox* (planted only), *Ipomoea Pes-caprae*, *Cassytha filiformis*.
   b. *Leguminosae*, *viz. Vigna marina*, *Caesalpinia crista*, *Entada gigas*.
2. Where the fruit is concerned.
   a. The contents only partly fill fruit cavity, *Dialium Schlechteri* which is buoyant, however, only for short distances.
   b. Due to empty seed cavities, *Scaevola Plumieri*.

II.—Floating power due to buoyant kernels only.

a. Non-leguminous, *Ximenia americana*.
b. Leguminous, *Canavalia obtusifolia*, *C. bonariensis*, *Sophora tomentosa*.

III.—Floating power due to aeriferous tissue in seed tests or fruits.

a. Buoyant tissue at periphery of seed or fruit, *Barringtonia racemosa* (fruit), *Terminalia katappa* (fruit), *Tacca pinnatifida* (seed), *Cocos nucifera*, *Xylocarpus obovatus* (seeds), and a *Cyperacea viz. Scirpus maritimus*. *Terminalia* and *Cocos* are planted.
b. Buoyant tissue inside seed testa, *Mucuna gigantea*.

Thus all the main groups, sub-groups and sections of littoral plants with buoyant seeds and fruits are represented in South Africa.

EXPLANATION OF PLATE III.

658, *Barringtonia speciosa*: 782, *Xylocarpus obovatus* (the "cannon-ball tree" of the East): 740, *X. moluccensis*. (All were collected by the writer).

Observations on the South African Beach Drift.

Scaevola Plumieri: 34% of fresh fruits floated in sea water after 100 days, and 47% of dried "stones" after 169 days. *Ipomoea Pes-caprae* grows with us as far as 34.5 Lat. S. compared with Guppy's erroneous world estimate of 30 Lat. S. *Canavalia obtusifolia*: the nearest station for this to the Riversdale beaches is near East London, about 400 miles: the same is true of *Hibiscus tiliaceus*. Seeds from living plants of *Canavalia bonariensis* received from Natal, and beach-drift seeds from Riversdale are identical; but seeds of *Mucuna acuminata*, a buoyant type sent by Dr. van Slooten from Java, can hardly be distinguished. The writer would like to see Natal plants growing as these species are very different. *Arachis hypogaea*, *Mangifera indica* (stones penetrated by sea water within five days, and sank a few days later), *Anacardium occidentale*, *Coix lacryma-Jobii* (2 to 6 days in fresh water), *Ricinus communis* (4 out of 60 floated after the tenth day, were planted and germinated), *Calodendron capense* (seeds found in drift at East London, Pondoland, etc., but only 3 out of 21 fresh seeds floated by the tenth day), and *Cryptocarya latifolia* (dead seeds common on the S. and S.E. coasts, traced by the writer to the Pondoland forests and thus identified) have little or no real capacity for floating and are of no importance to us here. *Podocarpus falcata*: "stones" plentiful in drift from Riversdale to East London, but only 5% of fresh fruits floated after the third day, and they are probably often carried by animals seeking fresh water on the sea-shore. The fruits of *Cassytha filiformis* which float for months in the Pacific were tested at Riversdale: only 18% were afloat after the eighth day which agrees more with results at Buitenzorg (Backer). The seeds of *Dodonaea viscosa* vary in buoyancy according to whether the station is coastal or inland: inland seeds at Riversdale sank at once. *Vigna marina* (including *V. luteola*, *V. lutea* and *V. retusa*) has seeds capable of wide oceanic transport, and grows in the strand flora from Swartkops to Natal and northwards. The seeds of *Thespesia populnea* are highly buoyant: the tree is fairly common in Zululand and Moçambique, but was not seen on tidal mud.

The bulbils of *Acidanthera brevicollis*, an iridaceous strand plant are washed about by the waves and have a buoyancy up to three weeks. Those of *Oxalis cernua* float when old and dry and drift specimens, when cultivated

grow, although most are dead. The tubers of the Asparagus already mentioned possess some buoyancy according to information from Dr. Rattray: those of *Rhoicissus Thunbergii* were still floating in sea-water at Riversdale after seventeen days.

The "stones" of the marginal drupe-like fruits of *Osteospermum moniliferum*, seeds of *Acacia Karroo* and *A. saligna*, "stones" of *Olea capensis* (non-buoyant), *Elaeodendron croceum* (1-4 days) and *Sideroxylon inerme* are accidental in the drift, being mostly voided by birds and mammals. Such seeds were planted and germinated at Riversdale, having sustained no injury in the intestinal tracts. Seeds of *Mimusops obovata*, *Cnidium suffruticosum* (1-2 days), *Hebenstreitia cordata* (4-5 days), *Anthericum revolutum*, *Datura stramonium* (empty seed cases only), fruits of *Zygophyllum Morgsana* (4-6 days, germinating subsequently), *Dimorphotheca fruticosa* (2-4 days, or slightly longer; marginal achenes), *Passerina rigida* (orange investment gives a buoyancy in a still room of 2-3 days), *Salsola Kali* (5-6 days) and *Cardiospermum Halicacabum* (only 6.2% of seeds afloat on second day) are not dispersed by ocean currents. The sea plays no part in the effective dispersal of *Lachnostylis capensis*, *Drypetes arguta* and *Spirostachys africanus*. Pieces of the stems of *Disphyma crassifolium*, an Aizoaceous plant, are carried considerable distances and again washed up by the sea, rooting readily in the drift. Some floated five days in sea water, were then planted and flowered.

The Foreign South African Beach Drift.

The total number of plants in the world effectually dispersed by ocean currents probably does not exceed two hundred. South Africa receives many alien seeds which, however, do not germinate where they are washed up. The futility of alien seed-dispersal on our coasts is due (1) to long immersion in the sea (rarely); (2) to injuries by fish or borers (rarely); (3) to erosion and decay in *Barringtonia speciosa*; (4) to unsuitability of new habitat, soil, climate, "increasing" and "decreasing" beaches, etc. There are few that are not viable and the author in the open air has raised from them plants of *Caesalpinia crista* (now thirty months old), *Afzelia bijuga*, *Strongylodon ruber* and *Dioclea reflexa*.

The source of our alien immigrants is often impossible to state with certainty. But *Barringtonia speciosa* occurs in Madagascar and the Comoros; *Afzelia bijuga* in Madagascar and the Seychelles: neither occurs on the African mainland.

Of 673 alien seeds found on our south coast only eight showed injuries. In nearly all cases the external condition was perfect. A large proportion was encrusted with marine organisms, bryozoa, serpulids, cirripedes, etc., which are regarded as evidence of a longer sea-journey or at least a longer sojourn in the sea. The common bryozoon on my seeds is *Nitscheina* (*Membranipora*) *tuberculata Bosc.* according to Mr. Farran, Department of Fisheries, Dublin. It is the same which invests Linnaeus' type of the Gulf-weed in the possession of the Linnaean society.

The amount of our alien seed-drift (excluding our west coast where it is much less plentiful) is enormous. Seeds arrive at any time but mainly from September to March, and especially after the storms — south-east winds and westerly gales — of that period which cast up the seeds (and fauna) of the Moçambique and Agulhas currents. As in Europe the arrival of seed with us coincides with the stranding of quantities of *Physalia* and *Velella*.

Percentage Frequency of Alien Beach Drift Components.

The following statistics are based on 669 alien seeds from the temperate part of our coasts, chiefly between Cape Agulhas and East London. Regarding a seed as impermeable only when it resists the penetration of water for weeks or months, they may be divided into

a. Impermeable, *Caesalpinia crista*, *Entada gigas*, *Dioclea javanica* (= *D. reflexa*). *D. reflexa* (form), *Mucuna gigantea*, *Strongylodon ruber* (= *S. lucidus*). *Afzelia bijuga*, *Sophora tomentosa*.

b. Permeable, *Barringtonia speciosa*.

c. Variable, *Erythrina indica; Canavalia obtusifolia*, *C. gladiata* and *Thespesia populnea*.

ANALYSIS OF ALIEN DRIFT-SEEDS.

	No.	*% age.*
Caesalpinia crista	203	30.34
Afzelia bijuga	113	16.89
Entada gigas	104	14.05
Mucuna gigantea	63	9.42
Dioclea reflexa (form)	56	8.37
Dioclea javanica	52	7.77
Strongylodon ruber	42	6.28
Mucuna sp. (my 7-8)	10	1.49
Sophora tomentosa	9	1.34
Barringtonia speciosa	4	0.60
Convolvulaceae (my 537-9)	4	0.60

	No.	%age.
Aleurites triloba	2	0.30
Erythrina indica	2	0.30
Cocos nucifera	1	0.15
Mangifera indica	1	0.15
(?) *Mucuna* or *Dioclea* (my 247) ..	1	0.15
(?) *Mucuna* (my 238) ..	1	0.15
(?) *Mucuna* (my 504) ..	1	0.15
Total ..	669	98.50

Professor Ewart applies the term " macrobiotic " to certain of the above seeds of which those belonging to the Leguminosae greatly surpass all others which may live from 15 to over 100 years. The percentage of tropical leguminous seeds in the above list is therefore 98.20 per cent.

For various reasons which cannot here be considered in detail, the writer suspects that, although *Entada gigas* and *Caesalpinia crista* grow abundantly around Lourenço Marques, most of our drift-seeds of these species do not arrive from there. It will be noted that an undoubted Madagascar seed, *Afzelia bijuga*, takes second place. The seeds of *Entada* and *Caesalpinia* were not common in the beach and river drift around Lourenço Marques contrary to what might be expected. Certain tropical East Coast seeds have not been found on the south coast, although known to the author, viz. *Colubrina asiatica*, *Tournefortia argentea*, *Ximenia americana*, *Guttarda speciosa*, *Hernandia peltata* and others.

Some Observations on our Alien Beach Drift.

In view of Ridley's statement that *Entada scandens* is not cosmopolitan within the tropics, and should be split up into a number of species, the writer ascertained definitely that our species is *E. gigas* (L.) Fawc. & Rendle (= *E. scandens* Bth.). Our drift seeds of *Afzelia bijuga* agree absolutely with fresh seeds procured by Mr. de Charmoy from the Chef de Service d'Agriculture, Madagascar. The drift-seeds named *Dioclea javanica* Benth. are identical with herbarium material sent me by Dr. van Slooten of Buitenzorg, Java, but this is usually given as a synonym for *D. reflexa* Hook. f. The seeds from our drift and from Java are, however, thinner and flatter than those of *D. reflexa* sent me by the Department of Agriculture, Trinidad, and by Sir A. W. Hill from W. Africa. The seeds named *Dioclea reflexa* (a form), brick or brownish red with dark mottling, cannot be determined definitely until material of the Madagascar form is obtained. Dissections at Riversdale show it to be a *Dioclea*, Kew reported it as " probably *Dioclea*," and the Curator of the Sibpur Gardens, Calcutta, "*Dioclea sp.*" Miss Knowles stated that typical seeds such as my 40 and 171 are similar to those in the National Museum, Dublin, presented and labelled by Dr. Guppy *D. reflexa*.

Seeds of *Mucuna* have always been difficult to identify: Schimper and Guppy did not succeed, and little success has attended efforts to name most of ours from the drift. Here also the solution lies with the courteous co-operation of our French friends in Madagascar, without which further progress is impossible. Seeds specially desired are *Mucuna atropurpurea*, *M. axillaris* (= *M. berneriana*) and other Madagascar, Mascarene or Indian species; *M. melanocarpa* said by Warburg to be cultivated in East Africa; *M. macrocarpa* from India and the East; Polynesian material of what Guppy named *M. urens* but which may be *M. gigantea*. The last named, after examination of the writer's material from Moçambique, has been united with *M. quadrialata* (K.B., 1931, 464).

The Convolvulaceous seed 537-9 has defied all efforts to name it. Capsules of *Jatropha curcas* from the Incomati River floated for 18 days; the seeds are non-bouyant. The indehiscent pods of *Dialium Schlechteri* floated from 9-36 days when the test was interrupted; water had penetrated all survivors by the pedicels; the seeds are non-buoyant.

The writer's sincere thanks for procuring and supplying foreign material for comparison are tendered to Professor R. H. Compton, Director, National Botanic Gardens, Kirstenbosch, (Queensland and Ceylon); Dr. I. B. Pole-Evans, Director of Plant Industry, Pretoria; Professor G. C. Nel, Stellenbosch. (British Guiana); Professor C. E. B. Bremekamp; Sir A. W. Hill, Director, Royal Botanic Gardens, Kew; the late Mr. d'Emmerez de Charmoy, Director of Agriculture, Mauritius; Dr. van Leeuwen and Dr. van Slooten, Buitenzorg, Java; the Director, Botanic Gardens, Sibpur, Calcutta; Professor Arthur F. Fischer, Director of Forestry, Manila, Philippine Islands.

He is indebted for help in other directions to Professor J. W. Bews, Maritzburg; Dr. L. Gill and staff of the South African Museum; Dr. Lloyd-Praeger, Dublin; Miss Knowles (the correspondent of Dr. H. B. Guppy), National Museum, Dublin; Mr. John Hutchinson of Kew; lastly and very specially Miss H. Forbes and Mr. A. P. D. McClean, Natal Government Herbarium, Durban.

[Since the above was written some rare fruits and seeds arrived on the Riversdale coast after the winds and

high tides of the September equinox. One, shaped like a fireman's helmet, is possibly a first record for the South African drift, and belongs to the tropical tree *Heritiera littoralis*, of which the southern limit is near Inhambane. Probably, however, it has come from Madagascar. It is one of the most famous of current-dispersed seeds. Similarly a fruit of the water-chestnut, *Trapa bispinosa*, has been picked up, probably from Natal, bearing a singular resemblance to the head and horns of an ox. It is not really dispersed by the sea. Two fruits of *Barringtonia racemosa* have been found, this being the most southernly record in the writer's collection for this sea-borne species. None of these four fruits was viable.

The discovery of a third seed may possibly unite my Nos. 504 and 214, but material is still scanty. Except for their colour, mottled black on reddish-brown, they resemble the seeds of *Mucuna urens* from West Africa, which are unspotted, greyish-black and also current-dispersed. The fact that not only the limits of distribution — distribution and dispersal are two different things —, but even the occurrence of this species in Asia and the Pacific have been the subject of dispute, adds to the difficulties.—J.M.]

Riversdale,
September, 1932.

Local Nature Reserves.

By R. H. Compton.

THE Botanical Society of South Africa has played a leading part in the movement for nature conservation in this country. On the one hand, it has endeavoured to strengthen and render more effective the Provincial legislation for the protection of wild flowers. On the other, it has fostered the idea of nature reserves where scenery and all forms of life, animal and vegetable, shall be guarded from the destructive influences of encroaching civilisation. It warmly supported the proposals for a great National Park in the Western Cape Province which have been adopted by the Natural and Historical Monuments Commission and laid before the Minister of Lands. And it has encouraged the establishment of smaller-scale reserves throughout the Union, whereby each district should set aside an area for the preservation of a sample of its natural scenery or veld with its own content of flora and fauna.

The scheme for a large-scale National Park is in abeyance for the time being, but the idea of local reserves or nature sanctuaries has made much headway, and several municipalities, especially in the Cape Province, have taken definite steps in this direction.

In order to inform the Botanical Society of the progress that has been made, many of the municipal authorities have been requested to supply information as to nature conservation in their own neighbourhoods. Courteous replies have been received from Town Clerks in the majority of cases, and quotations from these are given below (as indicated by inverted commas).

Bethlehem.

The Municipality has a reserve called The Kloof Park, a park of about 100 morgen adjoining the town. This is fenced and the natural features are preserved, a caretaker being in charge. Various improvements are made, rustic seats provided, etc., and the Park is much appreciated by the townspeople and visitors. There are a number of different kinds of buck, and the area is held as a sanctuary for birds, waterfowl, etc.; the indigenous plants and trees are also preserved.

Caledon.

"An area of nearly 200 morgen of kloof and mountain immediately behind the town has been set aside by my Council as a Wild Flower Reserve, which is daily patrolled by a Ranger and where further varieties of South African flora are being propagated with the assistance of the local Horticultural and Wild Flower Society.

All animals and birds are protected within the Municipal area.

The picking of flowers is prohibited on all Municipal lands."

As is well known, Caledon is situated in the centre of the richest area for Heaths. and the flora as a whole is remarkable for its beauty. Much of the land near the town is now agricultural, but the Caledon Municipality has taken active steps to preserve an area in the Swartberg

and to restore some of the flora which had been reduced by picking and burning. The advice of Professor Compton and Mr. Mathews was sought and given in connexion with this scheme.

On several farms in the district, moreover, the owners are taking steps to protect their veld from burning and their wild flowers from despoliation. On other farms. however, much destruction takes place and the condition of the Klein River Mountains, the Babylon's Tower Mountains and the Houw Hoek range, for example, is deplorable as the result of burning.

CAPE TOWN.

The destruction of game and certain other animals is prohibited over a considerable portion of the Cape Division, and birds and their eggs are also protected in certain areas. The ground on the eastward slopes of Table Mountain under the control of the Kirstenbosch Trustees was set apart as a Nature Reserve in 1922. In 1931 complete nature protection was given by Provincial proclamation and notices to the whole of Table Mountain and Devil's Peak above the 600 feet contour line: and it is anticipated that this protection may be extended to the Constantiaberg, Noord Hoek and Muizenberg mountains also. Much of this land is under the control of the Cape Town Municipality and the Forest Department; the public is excluded from some of the Municipal land as water catchment; but on the other hand there is little or no effective supervision of the Forest areas and offences against the regulations take place constantly. Moreover, the Forest Department itself could presumably destroy all the native vegetation on its own areas for tree-planting purposes, in spite of the proclamation. In fact, the new regulations, while making it easier to take proceedings against individuals found shooting or flower-picking, are far from giving the status of a nature reserve to the Mountain.

The proposal to acquire Smith's Farm and to convert the Cape Point area into a true nature reserve fell through and there is danger of further alienation of crown land in that part of the Peninsula. Certain areas of natural veld or mountain land such as Clovelly and other golf-courses, farms, etc., are protected by their owners, but it is clear that this has not the permanence of official action. The enforcement of the regulations frequently fails, as in the case of the buck near Simonstown, owing to inadequate police supervision.

The condition of much privately owned mountain land in the South Peninsula is nothing short of disgraceful to the owners and an eyesore to all beholders, owing to the unrestrained burning which takes place.

CERES.

The Council " intends establishing a reserve for the preservation of flora of the district.

The extent is not yet known, but will be approximately 2,000 sq. morgen along the slope of the mountain."

The mountain referred to is the Skurfdeberg in close proximity to the town, and at the head of Mitchell's Pass. Details are not available at present, but it is sincerely to be hoped that the depredations of flower-pickers, wood-gatherers and veld-burners may be definitely checked in this area at least.

CLANWILLIAM.

An area of 5,000 morgen of Crown land under control of the Clanwilliam Divisional Council, in the Lambert's Bay Local Area, has been fenced and is protected under the name of the Otterdam Reserve. This area consists of sandveld and has an interesting fauna and a strikingly beautiful spring flora. The Divisional Council is very anxious to reclaim sand dunes, coastal sands, etc., and to protect the various buck and the flora.

DARLING.

The Darling Village Management Board ".has not proclaimed or set aside any ground as a Wild Flower reserve, but the whole district of Darling comprising the Field Cornetcy of Zwartwater, Groenkloof East and Groenkloof West will shortly be proclaimed a prohibited area under Sec. 4 Sub-Sec. 2 first schedule of Ord. 19 of 1930. The Commonage of Darling would naturally be included in the area specified." The Darling district was formerly one of the richest in the Western Province in wild flowers, and semi-natural areas still exist although these have been materially reduced during the last two or three years by the extension of wheat cultivation. Measures to check the destruction of native vegetation are urgently necessary, and steps are being taken by some of the farmers to stop flower-picking.

EAST LONDON.

The Municipal Council of East London has recently " resolved that the whole of the area of the East London

Municipality be declared a protected area for wild flowers, plants, shrubs, and ferns." In addition extensive protection of wild birds obtains within the Division of East London including the Municipalities of East London and Cambridge and the Village Management Board areas of Amalinda and Macleantown.

FRANSCH HOEK.

The Fransch Hoek Council together with the Paarl Divisional Council and the Forest Department "are taking the necessary steps to prohibit the picking of any wild flowers in our area for a period of three years. Furthermore, a plot of ground approximately 20 morgen in extent has been given by the Council to the local Horticultural Society for a wild flower reserve.

As regards wild animals and birds, I may state that all wild animals are protected on our lands, and copy of a proclamation in regard to wild birds is enclosed herewith."

It has been pointed out that the approaching opening to motor traffic of the Fransch Hoek Pass may result in the despoiling of an area rich in flora which has up to now been inaccessible to motorists and to lorry-owning professional flower-pickers. It is most desirable that this should be safeguarded and patrolled.

GRAAFF-REINET.

A little time ago a movement was on foot to protect the Valley of Desolation as a scenic reserve and nature sanctuary. Unfortunately little progress has been made and the Town Clerk writes that "My Council cannot consider the establishment of Nature Reserves at the present time.

The necessity, however, of taking some action to preserve the flora and fauna of our country is very apparent, and I desire to assure you of my Council's sympathetic treatment when circumstances permit of something being done." Public-spirited citizens constructed a motor road to the Valley, and it had been hoped that this might be part of a larger scheme for scenery and nature conservation in the neighbourhood. In view of the sympathetic attitude of the Town Council, it is to be hoped that the project may be actively taken up again when better times return.

GRAHAMSTOWN.

A committee of Grahamstown residents has for some time been working to establish a nature reserve in the neighbourhood of the city, and the interest and support of the Mayor and Corporation have been successfully enlisted. "The City Council has approved the principle of establishing a Nature Reserve for the preservation of wild flowers, animals and birds. It has therefore resolved to hand over to the Grahamstown Nature Reserve Society a portion of the slope on the Mountain Drive, in extent about eighty morgen, for that purpose. The Society has been formed and is now actively engaged in clearing the area of the growth of pine trees and noxious weeds. The area will be fenced as soon as possible." The Society is working in close touch with botanists at Rhodes University College and the Albany Museum, and it is anticipated that results of scientific interest may be obtained from the enclosure of the ground and the eradication of exotics; and an attempt is to be made by judicious planting to bring together a collection of all the typical plants of the immediate neighbourhood. The new Reserve will be a valuable addition to the educational advantages of Grahamstown.

In addition to this Reserve, "the City Council has recently resolved to protect all wild birds upon lands under its control.

All wild birds and game upon the Waterworks area, i.e. the Farm 'Palmiet' at Howieson's Poort, are already protected."

MALMESBURY.

The catchment areas for municipal water supplies provide admirable opportunities for nature preservation, for in general the natural vegetation is the most suitable ground-cover for the practical purposes of checking erosion and silting. The Malmesbury municipality has taken advantage of this and the Town Clerk writes: "I have pleasure in advising that my Council has a reserve of 500 morgen of mountainous country in the Paardenberg Range, being the catchment area for the water supply of the Town, which is suited to the protection of game and plant life.

The area is effectually fenced in and is ideal for the seclusion of game, of which at the present time there are flocks of rhebuck.

The municipal authorities exercise every precaution to protect these game reserves and our national flora by means of fences and caretakers. The public can only gain access to these areas upon production of a permit from the Town Office." That the people of the Malmesbury district are alive to the value and beauty of their local flora may be gathered from the following note by the Mayor:

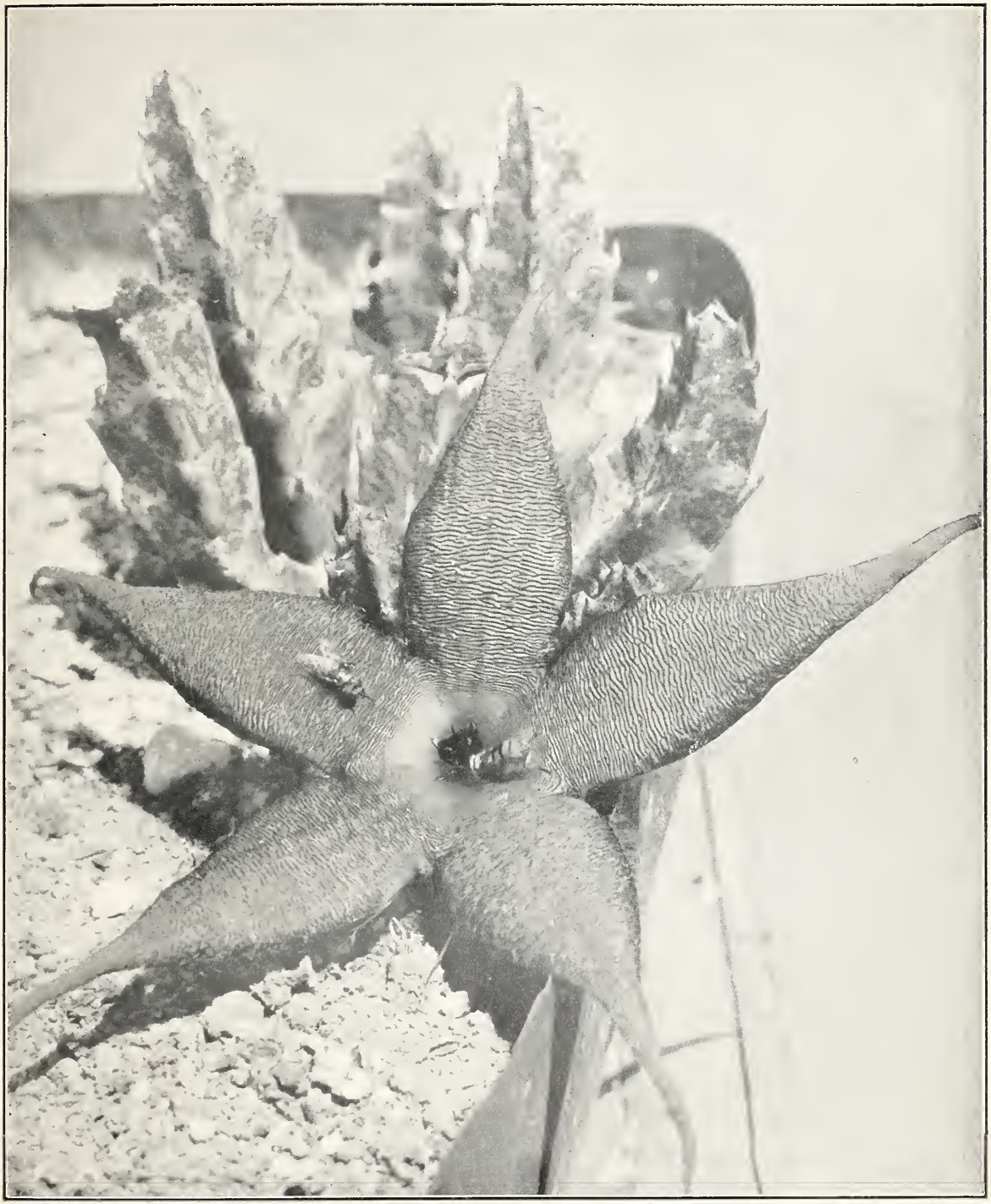

Photo: R. H. Compton. PLATE IV. Stapelia Schinzii: blow-flies visiting the flower.

" Wat betref hierdie distrik, het die stadsraad reeds 'n pragtige bergagtige stuk grond, groot 500 morge behoorlik toegekamp onder die wakende oog van opsigters, waarin nie alleen gewasse en blomme weeldeng groei nie, maar ook voortplanting van allerlei soorte voortgesit word. Dan word ook baie aandag aan die aankweking van kaffertuine in die gronde rondom die Stadhuis gewy.

Vooraanstaande sekamanne en sekere modelboere is bewus van die noodsaaklikheid om vandalisme alleen te verhoed nie, maar beslis stop te sit. Blomme van bosse loos nie so 'n groot gevaar om uitgeroei te word as blomme van bolle nie, behalwe in geval van veldbrand wat tog nou gelukkig baie selde voorkom.

Dit is verblydend om te kan meedeel na noukeurige ondersoek 'n persoonlik onderhoud met sommige plaaslike liggame en vereniginge dat hulle absoluut eens is met die gesigspunte van die voorstanders van die blomme beskermingsbeweging en kan derhalwe op hulle hartelike ondersteuning staat maak, as bewys daarvan spreek die inkamping van wilde blomme en maak van tuine deur die plaaslike liggame vanself.

Dit word bespeur langs publieke paaie in die rigting van Darling dat sommige boere, wat openbare welsyn beoog, kennisgewingsborde op hul plase opgesit het, dat die pluk van blomme streng verbode is en dat oortreders vervolg sal word. Hierdie persone wil ons gelukwens en hoop dat sulke voorbeelde as spoorslag sal dien."

Montagu.

Efforts have been made from time to time by members of the Botanical Society to secure the reservation of the remarkable Baths Kloof and its immediate surroundings as a nature sanctuary. The preservation of the scenery and the natural flora, fauna, bird-life, etc., in this Kloof would be a great advantage and attraction to the town, and it is understood that, although certain obstacles exist, the Council is taking steps in this direction. " Much is being done by the Council to preserve certain parts of the Commonage in order to protect local plants, wild flowers and birds, and it is anticipated that the proposed reserve in the Baths Kloof will become a most attractive place as well as a few other Kloofs surrounding Montagu."

Paarl.

The developments that have recently taken place on the Paarl Mountain including the construction of the fine scenic Jan Phillips Drive have given an opportunity for the provision of a nature reserve within easy reach of the town. The matter is being actively taken up, and the Town Clerk writes: " Much as I desire to assist you in collecting data for publication, I regret that at this stage it is not possible to assist you to any extent, for the reason that the Wild Flower Reserve on the Paarl Mountain to which you apparently refer, is now only in the course of development, and accordingly I cannot supply you with many details.

I may state, however, that the area of land which is so prepared and developed is on the Paarl Mountain, and is in extent approximately 5 morgen. The situation of the place has been described by experts as ideal for the purpose — it has been fenced in and various species of wild flowers have just been planted therein.

The expenditure incurred so far in connection with the Reserve is very small, but it is the Council's intention to make provision in its estimates of Revenue and Expenditure for a fairly substantial amount to be expended on the reserve annually for the next four or five years. It is also the Council's intention to take steps to have all wild flowers in the Paarl mountain protected by Proclamation or otherwise."

With regard to birds, these are comprehensively protected throughout the Paarl Division by Provincial Notice.

Port Elizabeth.

The Town Attractions Committee has recently recommended to the City Council (a) That a nature reserve be established in that section of the Baakens River Valley Park lands between the quarry and Target Kloof Road which is about to be cleared of " prickly pear," and that gradually flora typical of the Eastern Province, particularly aloes, cycads, yellow-woods, etc., be introduced in this area.

(b) That the area mentioned in (a) hereof be fenced in to exclude animals, wood stealers, and undesirables, and that entrances be made easily accessible to visitors.

(c) That the Walmer Town Council be approached with regard to its declaring the other side of the Baakens River Valley between the points mentioned in (a) hereof as a similar nature reserve.

The Superintendent of Parks writes as follows:—

" Arising out of this, the practical result is that I am now clearing the Baakens River Valley from Prickly Pear, an area of 200 acres which is right in the centre of the City, between the central hill and South End with Walmer on the south boundary. If you do not know this spot, I

can say that it is a wonderful piece of country with permanent water, krantzes and natural rockeries.

We have certain Trust Funds available for development which I trust will be spent on the gradual re-habilitation of the area to the state in which it was say in 1790.

In addition to Baakens River Valley, the Council have declared the catchment areas of the Van Staadens & Bulk River water supply, strict nature reserves."

QUEENSTOWN.

The Secretary of the Queenstown Horticultural Society writes as follows:

"The Queenstown Nature Reserve was started in 1928.

Realising how necessary it was to have such a place in the district, and how valuable an asset it should become to the town, the Horticultural Society took the matter in hand and invited Professor Compton to assist in the matter of selecting a suitable site.

The place chosen is a kloof on the eastern face of the mountain, which is locally called "Madeira," and it is approached by a drive of about two miles on the Hangklip Road. It is well sheltered, with good soil and favourable aspects, and is well watered by a spring which is seldom dry.

The Kloof forms a horse-shoe — the lower slopes on either hand run up to a fine mass of rock at the head, forming a broad krantz from which beautiful views are obtained.

In the Reserve are a number of fine specimens of the Acacia Karoo, which afford good protection and shade for visitors and picnic parties. Shrubs are also well represented in Polygala myrtifolia, Buddleia salvifolia, Halleria lucida with some fine trees growing in the sheltered places under the krantz. In the spring the brilliant orange-scarlet "Wag 'n Bietje" (Erythrina acanthocarpa) mixes with the deep blue of Aster filifolius and the Reserve is also carpeted with Gazanias in a wonderful variety of colouring.

A fairly representative collection of the local flora may be found there, including Leonotis Galpinii, Kalanchoe thyrsiflorus, Crassulas, Cotyledons, Anacampseros lanceolata, Stapelias and Huernia spp., Haworthia translucens on the ledges of the rocks, Hereroa sp. Euphorbia bupleurifolia, Euphorbia Ernestii, Stomatium sp., Bulbine sp., Delosperma, Hypoxis, Gladioli and many others.

A blaze of bright orange in the winter time is presented by the magnificent blooms of Aloe ferox which clothe the lower slopes and their colour is intensified in the evening by the last rays of the sun shining across them to the brown of the surrounding veld.

There is no doubt that protection has done much for the Reserve — it presents a very different picture now to what it was a few years ago, and it is hoped at some early date to be able to extend the Reserve to the top of the hill — this would include one or two interesting koppies and a valley which, during the season, is bright with Harebells (Dierama pendula), Cyrtanthus and Brunsvigia. The sheltered side of the rock face near the top is clothed with Streptocarpus and innumerable ferns as also is the krantz face lower down.

The Reserve is gradually becoming opened up and good paths made, and it is becoming very popular with townspeople and visitors.

The great aim and object of the Society, in which they are most sympathetically helped and assisted by the Council and the Commonage Ranger is to try and preserve in one spot of the countryside what should be growing all around us, if it were not for the overstocking of cattle, native woodcutters, fires, and flower and bulb collectors — a combination of evils which is rapidly denuding our veld and hillsides of all the original vegetation."

The Horticultural Society should be congratulated on the good work accomplished. Although legal protection is given to the flora, game and birds on the whole extensive Queenstown commonage, it is clear that this is of relatively little avail in view of grazing and depredations, and that such a Reserve as has been established is the only way of preserving the natural vegetation of the area without serious degeneration.

SWELLENDAM.

An area of about 250 morgen has recently been established by the Swellendam Municipality, in connexion with the town water supply, as a Wild Flower Reserve. The area is one of great natural beauty and is set in a magnificent landscape, and the content of flora is of great beauty and interest. The ownership of the land is in the hands of the Forest Department which assists in its protection through the local forest officer. The Reserve is fenced and favourable results in regard to the increase of flowers etc. are already reported. The Reserve lies at less than a mile from the town and is becoming an asset of considerable value.

TULBAGH.

The Town Clerk writes that "the preservation of the flora in this district is subject to protection of Provincial Administration Notice No. 156, 1930 (see September issue, page 574), promulgated on 12.9.32. A Protection Society has been formed consisting of two members, and the Secretary of the Divisional Council; representing Tulbagh Council two members and the Town Clerk. At a meeting of the Society held on Friday, 14th October, 1932, it was decided:—

(a) To distribute circulars amongst prominent farmers in this district including the local High School, the Coloured School, and several other institutions, and Public bodies.

(b) To nominate a number of prominent farmers in the district, duly constituted as a sub-Committee, the individual members having assured the Society of their support.

(c) That a number of notice-boards (20) be erected where they can easily be read. Several have already been erected in the Tulbagh Village, and others are in course of erection, i.e., at Koopmansrivier, Bushmans Rock, Vierentwintig Rivier, The White Bridge, Brede River, and at Bloubank, also at Tulbagh Rail. Any expense in the matter to be jointly divided between the two bodies already referred to."

The circular mentioned in paragraph (a) reads as follows:—

"Dit het onder die aandag van beide die afdelingsraad en Munisipaliteit van Tulbagh gekom dat ons Veldblomme en Blombolle beskadig, en uitgeroei word.

By geleentheid van 'n Komitee vergadering gehou op 14 Oktober 1932, bestaande uit beide liggame voormeld, is dit Algemeen Besluit om Regulasies No. 156 van 1930, wat deur die Administrateur in werking gestel is streng uit te voer. Gevolglik, is daar alreeds kennisgewings opgesit binne die grense van Tulbagh dorp, dieselfde prosedure sal gevolg word in die Tulbagh distrik.

Daar is ook 'n Waaksaamheids Kommissie aangestel wat grotendeels uit boere bestaan, woonagtig in die Tulbagh distrik, en wat verantwoordelik sal wees om saam met die ander liggame, alle pogings aan te wend, om die uitroei van blomme ens., streng te bestry. Die Publiek word hiermee gewaarsku dat "Niemand sal toegelaat word tot latere kennisgewing, Veldblomme, Varings, of struike, sonder toestemming te pluk, insamel, ontwortel, breek of beskadig nie, of in besit daarvan te wees nie.

Die samewerking van die Publiek sal baie op prys gestel word."

WELLINGTON.

The Wellington Town Council has recently set aside a portion of the Municipal farm "Poplar Grove" on the road from Wellington to Bainskloof for the purpose of protecting flora, but the reserve will only be fenced in at a later date. So much destruction has taken place as the result of repeated veld fires in this area that it is hoped that not only fences but efficient fire-breaks and patrolling will be provided to safeguard what should be a valuable reserve and an asset to the town.

WORCESTER.

The Worcester "Council has not as yet established any nature reserve for the protection of plants and wild flowers.

The Council has, however, granted to the Government an area of land in extent approximately 130 morgen for a Karoo Veld Reserve.

The Council has further protected all wild birds on the Commonage and has closed the Commonage against hunting, killing or destroying of all game for a period of three years."

The veld reserve consists of certain karoo-like hills lying near the foot of the Hex River poort. This area has not been effectively fenced and no special means are apparently adopted for its preservation or use.

* * * * * *

The foregoing summary of what is being done in the various centres is by no means complete. Some towns which have established or are thinking of establishing Nature Reserves may have been inadvertently omitted. Moreover, there are all grades between the complete Nature Reserve, fenced, patrolled and uninterfered with, and the ordinary Town Commonage, the natural features of which, flora, fauna, etc., are "protected" by regulations in the Gazette but by no other discoverable means. In a great number of commonages it is prohibited to pick wild flowers, damage bushes, etc., etc.; and yet grazing cattle

commit these offences with a thoroughness which few human beings could equal. Many of the towns in the native territories have protected commonages; and yet it is practically impossible to enforce any regulations against the dense surrounding poverty-stricken native population.

In addition to reserves and commonages in public ownership there are numerous farms in the Cape and other provinces which their owners regard, in whole or in part, as nature reserves. In many cases game is protected by the owner, and some rare animals have been saved from extinction in this way: in other instances wild-flower gathering is prohibited. The practice of settng aside a portion of a farm — and the typical South African farm usually contains a considerable superfluous acreage — is to be highly commended. At the same time, of course, personal ideals change from generation to generation, and a private reserve is at the mercy of the owner for the time being in a greater degree than a reserve in public ownership.

Public bodies, however, tend to make paper regulations and leave it at that. It is clear that mere legal protection of an area is quite inadequate to save flora and fauna where grazing rights and the like exist. The only effective method of reservation is to fence the area and to appoint special custodians. The area itself should be in public ownership — crown, municipal or divisional property — so that reasonable security of tenure and continuity of interest are obtained; and the plan which has been adopted in several instances, namely to inspan some local voluntary body such as a Horticultural Society or a Committee formed ad hoc, is a very good method of arousing local interest and keeping the Reserve alive.

When Municipalities have realised what an asset to a town a well-established Nature Reserve can be, both for the interest and recreation of its townspeople and of visitors; and when they have also realised that by establishing such a Reserve they are doing their bit in saving the unique features of their own districts from destruction for the benefit of science and posterity, then we may expect the establishment of local nature reserves to be regarded as vital parts of the duties of municipalities all over the Union. There is hardly a town which has not some area in its vicinity worth preserving and which would be enormously improved by such preservation. A beginning has been made, and some towns are showing an example which other towns may follow to the lasting benefit of themselves and their country.

Kirstenbosch,
December, 1932.

Some Noteworthy Flowering Shrubs at Kirstenbosch.

By J. W. MATHEWS.

DURING the course of the last century various classes of Cape Plants have had their vogue in the gardens of Europe: Cape Bulbs, Cape Heaths, Cape Geraniums, Cape Succulents, and Cape Annuals. One or the other has been the dominant feature in well-appointed gardens at various times. Some of the bulbs, geraniums and pelargoniums, and annuals, have followed the paths of civilisation throughout the world, and still hold sway in their improved varieties in all countries.

Cape Shrubs, as shrubs, have never been the fashion, but as the interest in gardening has grown keener in the temperate countries of the world, there is a decided demand arising as a result of their cultivation at Kirstenbosch. Visitors from all countries are enthusiastic over their distinctiveness and colourfulness. Their ornamental value is such that within a decade or two they are certain to become a dominant feature in the gardens and parks of those countries with a suitable climate for their outdoor cultivation.

One very pronounced feature of the trees and shrubs of South Africa is the predominance of evergreen species. Under adverse climatic conditions some, normally evergreen, become partially, or even completely deciduous. Others, like the Buddleias, cast the old as the new is developing. This

season the Greyias, normally deciduous for their period of flowering, for the first time have retained their foliage throughout the winter, and that during a wet, windy, and cold winter, which suggests that deciduousness is dependant on the almost frosty nights occurring during periods of fine weather, and which have been absent this winter. It is therefore scarcely safe to say we have any shrubs which are deciduous under all conditions.

Greyia.

In the Flora Capensis Saxifragaceae is represented by five genera, each with but a single species, Greyia being represented by *G. Sutherlandii* from Natal, and the Orange Free State. It was introduced into Europe in 1859, and the genus was named in honour of Sir George Grey, Governor-General of Cape Colony, and the specific name after the collector, Dr. Sutherland.

It is a very handsome and distinct shrub growing up to twelve feet in height, and with rather bold round leaves at the tips of thick fleshy-looking branches. The bark is green turning to brown on the young wood, and greyish on the old. The densely-flowered racemes are terminal, and of bottle-brush shape. The crimson flowers with exserted stamens are very showy and persistent, and borne in winter and early spring when the plants are usually bare.

A second species, *G. Radlkoferi*, was discovered about 1888 in the Barberton district of the Transvaal. It is of similar habit to the above, but differs in the smaller inflorescence, and the woolly leaves, particularly on the undersides.

G. Flanaganii completes the known species up to the present. It was discovered in the Komgha district of the Cape about 1894. In habit it is of more upright and taller growth than the above, with the shining glabrous foliage of *G. Sutherlandii*. The individual flowers are much larger, with the shape of Abutilons, Chinese Lantern style. The racemes are fewer-flowered, at the most having eight or ten flowers. The plant is almost consistently evergreen with the flowers at the base of the young growths, and intermingled with the leaves.

Propagation is readily effected by cuttings of ripe tips during March, or at any time before new growth starts. For permanent planting a fairly rich soil is required, with a fair amount of moisture at all times.

They are seen to the best advantage as single specimens on a bank or slope, on the lawn, or with a background of evergreen coniferous plants, when the many distinct characters are pronounced.

Brunia.

Very distinct contrasts to the Greyias are found in another purely South African genus, the Brunias. Although closely related botanically they are for garden purposes wide apart. The habit of the plants is distinct, being made up of numerous erect leaders, clothed with whorled and divaricate side branches which do not assume the character of leaders, or flowering branches. All parts are densely leafy with erect or patent heath-like evergreen foliage varying in length in the different species. The general outline is somewhat flat-topped, after the shape of a tumbler. The foliage is very persistent, the lower parts becoming bare only with age, which may be rectified by cutting back one or two of the leaders to near their base. All species are worthy of a place in gardens, and the most distinct will be objects of interest and beauty to all.

B. nodiflora, introduced to Europe as long ago as 1786, is rather more coniferous than heath-like in foliage. It is a shrub up to six feet, and is somewhat irregular in habit. The flowers are white, arranged in balls up to three-quarters of an inch through, and aggregated into flat heads eight to ten inches across. It should be a useful plant for the back of a rockery, and is worth a trial as a low hedge for providing shelter in the flower garden.

B. macrocephala is very distinct in growth and branching, the plant being made up of several leaders sparingly- and widely-branching. The branches are wiry and pliable, but densely leafy, and do not reach flowering strength. The flowers are white, but the beauty of the plants exists in their habit, combined with the iridescent colouring of the foliage and flower heads, where it is much intensified. A useful plant for single specimens on the lawn or other permanent position, or for a formal line of individuals.

B. Stokoei is a new species recently discovered by Mr. Stokoe, the indefatigable and successful hunter after new and rare plants in the recesses of distant mountain ranges. The habit and height of the plant is similar to *B. macrocephala*, but more sparingly yet longer branched. The young flower heads are silver-grey with crimson stalks with a touch of deep yellow here and there. The open flowers are crimson, completely hiding the silver-grey when in full flower, and supply the finishing touch to a striking and effective plant.

The Brunias have been likened to the Dacrydiums, but perhaps are best described as resembling somewhat the erect, shrubby, freely-branching Lycopodiums, with softer foliage and general effect. Their distribution is confined to the winter-rainfall area, and so withstand the summer

drought, although the usual amount of garden watering would be of benefit to them. Seed is produced freely, and the seed heads persist on the bushes for three or four years. They are best raised from seed to secure perfect and natural plants. They should prove highly ornamental foliage pot plants for winter gardens, or house decoration in cold countries.

Leucospermum.

Any mention of South African flowering shrubs would be incomplete without the inclusion of one or more genera of Proteaceae. An order represented in South Africa by 14 genera containing 300 species, and upwards of a hundred imperfectly known ones. The plants of the various genera are very distinct from each other in general appearance, as well as in the form of flower and general decorative effect in the garden. In the Proteas, the bold foliage and the large variously-coloured involucral bracts surrounding the flower heads are the most effective features. In the Leucospermums the involucral bracts are mostly inconspicuous, and the beauty and colours are most highly developed in the flowers with their long protruding styles and stigmas.

The genus includes over thirty species, of which about half are safely established in the Gardens, and are the most distinct and striking flowering shrubs existing. The flowers are unique in form and outline, the colours are bright and attractive, and the freedom of flowering and lasting qualities of the blooms are unsurpassed. The period of flowering is from three to four months long for each species, and for the genus from about July to January.

They are mostly confined to the coast belt of the Cape, with *L. attenuatum* extending as far north as Swaziland and Gazaland on the east coast. A few are native of the sand flats, but most are found on the hillsides or the sandy valleys of the mountain ranges. None are streamside or bog plants, but *L. grandiflorum* is occasionally inundated during winter. Propagation is effected by seeds, which, unlike the Proteas mostly requiring a year for seeds to mature, are ripe and fall from the outer flowers of the head almost before the flowers are fully open in the centre. Few seeds are produced as a rule, and germination is very erratic and uncertain, so that increase is very slow. Probably germination is in cycles, as has been found in numerous other wild plants, and roasting may secure a more even and quicker germination.

The largest flowered species are *L. nutans*, *L. mixtum*, and *L. Bolusii*. They are alike in habit, making a bush about four feet high, and seven or eight wide. The foliage varies somewhat in outline, but is permanently grey-tomentose in *L. Bolusii*, which has lighter coloured flowers, being mostly yellow tinged with vinous pink. In all the stigmatic knob is yellow, but the styles in the other species vary in different plants to a bright crimson. The plants are fairly dense, with the bottom branches lying on the ground. Flower-heads are borne at the ends of the branches, and one to three heads may be produced in succession. The flower-heads are circular, rather flatter than long and made up of a close cushion of recurving or rolled florets with the slightly incurving styles extending half their length above, and giving rise to the common name of "Pincushions."

L. conocarpum makes a dense globular bush or small tree up to fifteen feet high, and as much through. The flower-heads are yellow, a little longer than wide, and of smaller size than the above. The leaves are closely set, hairy, and of a greyish dark green.

L. incisum is an erect-growing, sparsely-branched, small tree, up to fifteen feet in height. It is somewhat globular in outline above, but not retaining the branches to the ground level as will *L. conocarpum*. The cushion of florets is reddish purple, and the styles orange, of a shape and size similar to the last species.

L. attenuatum is a rather stiff dwarf plant about four feet high, with glorious heads of guinea-gold styles and mauve-tinted cushion. A dwarf counterpart of *L. incisum* differing only pronouncedly in colour and stature.

L. tottum is flowering for the first time this year. It is a dwarf bush up to three or four feet, and rather more through, with the lowest branches on the ground. The flowers are freely produced, and with the dark florets of *L. incisum*, and amber styles. The head is rather more loosely and irregularly formed than usual.

L. lineare is a dwarf species up to three feet, but somewhat variable in habit. It is sparsely branched with long narrow pine-like leaves. The flowers are crimson throughout, and freely produced. A variety with green flowers, occasionally slightly tinged red, is rather taller in growth with the lowest branches extending well out on the ground.

L. grandiflorum is an erect branched shrub up to five feet. Not so densely leafy as most, and greyish with hairs. The flower-heads are self yellow, with the styles crimsoning with age, when they are more effective.

L. reflexum is without doubt one of the finest and most outstanding flowering shrubs of the world. The whole

plant is grey overlying purple, rather sparingly branched, with long, ascending, shortly leafy shoots, with the parachute-like flower-heads poised on the tips. Crimson predominates in the flower with the styles tipped with yellow. The whole effect and colouring is unique. The constantly changing position of the styles, from incurved in the young stage to fully reflexed or depressed around the stems, and then back again to a parachute outline, is remarkable.

It makes a freely-branched shrub up to fifteen feet in height with a rather less spread of the lower branches.

L. crinitum and *L. oleaefolium* are much alike, with *L. crinitum* readily recognised by the long feathery tips of the involucral bracts. The bracts are greenish amber with greyish tips, styles at first amber changing to bright crimson with age. The flower heads are an inch and a half both ways, and freely produced in succession over a long period, five or six being clustered in the axils of the leaves at the tips of the shoots, and varying in colour with the different stages of development. A neatly formed shrub up to four feet in height, and about the same spread.

L. buxifolium is an erect-branched shrub up to five feet in height. The branches are densely leafy with distinct grey-green rounded leaves. The cushions of the heads are neatly formed of the tips of the bracts, purplish brown in colour with tufts of white hairs. The exserted styles are vinous pink with yellowish stigmas. The heads of this and the two following species are most suitable for making up the much favoured Victorian posies.

L. puberum is a low well-branched spreading bush up to four feet in height, and six or seven wide. The colour tone of foliage and branches is dark grey, with the flower-heads mainly deep crimson. The flower-heads are small and freely produced. Altogether a charming plant, yet quite distinct from the above.

L. prostratum is a prostrate, trailing plant with a spread of five or six feet. The foliage is greyish green with hairs, and the heads yellow and crimson and very sweetly scented. Branches are numerous and make a complete mat for ground cover, or for stone walls. The leaves are small, yet clothe the stems, and the small heads are freely produced. An effective and distinct species.

The Leucospermums mentioned are of easy cultivation on a well-drained loamy soil. Deep cultivation of the soil is of benefit to the plants during the dry season, and the flowering period is prolonged in seasons of late rains, suggesting that intelligent watering in dry seasons will be an advantage. They are, however, perfectly hardy to drought after the first season of planting, during which they should have an occasional watering. Quite a number are at home on a well-drained sandy soil, where they should prove of great value compared with the usual run of garden shrubs in such positions.

Kirstenbosch,
December, 1932.

South Africa at Vincent Square.

THE contributions which South Africa has made to the horticulture of the world are so conspicuous that they are frequently overlooked. The Gladioli and Pelargoniums are among the most popular and universally grown of any garden plants, and though after their long history of hybridisation and selection their connexion with their original home may seem somewhat remote, we in South Africa should remember it for our own guidance: for who knows what others of our familiar veld-blomme may not attain the same fame and usefulness? There is always something new out of Africa.

The Royal Horticultural Society holds fortnightly exhibitions at Vincent Square, London, and on these occasions a certain number of Awards of Merit are bestowed upon particular exhibits on the grounds of novelty, beauty and interest. An award of merit is greatly prized by the exhibitor, and it serves, moreover, to introduce a particular plant to the notice of growers and amateurs who are always on the lookout for attractive novelties for their own delectation or profit.

In the course of the last few years many South African indigenous plants have been exhibited at Vincent Square, and the following list, which has been compiled by Mr. J. W. Mathews, gives the names of those species which have gained the Award of Merit, together with dates and the names of their exhibitors. The list includes bulbous plants,

shrubs, water plants, annuals, perennials orchids and succulents. Each plant has its own special beauty and interest: some are for the specialist, others are suitable for colour effect or landscape gardening, others will find their natural places in water garden, rockery or temperate house: all of them represent the contributions which South Africa is making to the beauty and wealth of gardens.

It may be pointed out that Kirstenbosch is responsible for the introduction to England of a considerable number of the plants mentioned in this list, in some cases through horticultural firms, in others through membership of the Botanical Society. It may also be mentioned that the majority of the plants mentioned are in cultivation at Kirstenbosch, where they, and many others of equal beauty, can be seen in their season by visitors.

Plants Gaining Award of Merit.

Date.	*Name.*	*Exhibitor.*
1925		
May 19	Lachenalia glaucina	Rev. J. Jacobs
April 7	Diosma uniflora	Rev. Boscawen
Sept. 9	Hermannia candicans	Sir William Lawrence
Nov. 17	Leonotis leonurus, Warren Variety	E. M. Preston
1926		
Feb. 9	Cyrtanthus lutescens	Mrs. F. Platt Barlow
„ 23	„ O'Brieni	Sir William Lawrence
June 29	Arctotis breviscapa	T. Hay
July 13	Tritonia hyalina	E. A. Bowles
„ 27	Scabiosa anthemifolia, variety	Messrs. House
„ 27	Phygelius capensis, variety	Messrs. G. Elliott
Aug. 10	Satyrium coriifolium	A. Perry
Oct. 19	Kniphofia multiflora (Natal)	Messrs. Prichard
1927		
Jan. 25	Aloe ciliaris	"La Mortola"
April 5	Arctotis breviscapa, variety	Messrs. Ladham
„ 5	„ scapigera	T. Hay
May 10	Myrsine africana	Lt.-Col. Messel
„ 24	Aponogeton distachyon, variety	"Aldenham"
„ 24	Hypoxis Baueri, variety white	Mrs. S. Garnett Botfield
„ 24	„ „ variety rose	Mrs. S. Garnett Botfield
June 28	Eucomis bicolor	Mrs. Carl Holmes
Aug. 16	Watsonia "Orange Beauty"	Lady Aberconway
1928		
May 27	Gazania pavonia	T. Hay
June 5	Venidium fastuosum	T. Hay
„ 26	Ursinia anethoides	T. Hay
Sept. 27	Protea compacta	Hon. Mrs. Ryder
1929		
May 21	Aponogeton leptostachyon	A. Perry
June 11	Heliophila longifolia	T. Hay
„ 11	Stapelia nobilis	E. M. Preston
„ 25	Streptanthera cuprea	A. Perry
1930		
April 23	Dimorphotheca chrysanthemifolia	Messrs. Sutton
June 17	Gladiolus callistus	C. Ingram
1931		
Mar. 24	Anemone capensis	T. Hay
June 23	Ursinia pulchra	T. Hay
July 28	Orpheum frutescens	Sir William Lawrence
„ 28	Watsonia Fourcadei	C. Ingram
„ 14	Haemanthus Katherinae, (First Class Certificate)	Kew
„ 14	Lobelia campanulata	Messrs. Ryder

The Botanical Society of South Africa.

ANNUAL REPORT, 1931.

The work of the Society has proceeded steadily during the year under review, and in presenting this, the Eighteenth Annual Report of its proceedings, it is gratifying to record that satisfactory progress has been made in the membership, proving that the Public are in sympathy with the Society's aims and objects, which primarily are to render financial aid to the National Botanic Gardens.

MEMBERSHIP.—The Membership of the Society stands at:—

Life Members	73
Family Members	77
Ordinary Members	753
Associate Members	437
	1,340

which is an increase of 61 as compared with the previous year.

FINANCE.—As will be seen by the Balance Sheet, the yearly contribution to Kirstenbosch is the largest ever made from membership revenue after deducting working expenses and cost of Journal.

MEETINGS OF COUNCIL. — Four meetings of the Council, as laid down by the Constitution, were held during the year. At the Annual General Meeting held on the 21st April, 1931, the following Office Bearers were elected:—*President*: The Rt. Hon. Sir James Rose-Innes, P.C., K.C.M.G.; *Vice-Presidents*: Sir Lionel Phillips, Bart.; Sir Max Michaelis; and J. B. Taylor, Esq.; *As Members of Council*: Lady Phillips; Dr. Lilian Robinson; Miss D. Fairbridge; Miss F. M. White; Mrs. L. Bolus; Miss E. Struben; Mrs. H. S. van Zijl; Sir Drummond Chaplin, K.C.M.G.; Major G. B. van Zyl, M.P.; Professor R. H. Compton; Wm. Duncan Baxter, Esq.; Professor R. S. Adamson; W. de N. Lucas, Esq.; C. J. Sibbett, Esq.; W. A. Eaton, Esq.; P. Ross Frames, Esq.; Dr. Bennie Hewat; H. Tevis, Esq.; H. C. Starke, Esq.; F. E. Cartwright, Esq., *Hon. Secretary and Treasurer.*

Three vacancies having occurred on the Council during the year, the following were duly elected to serve:—Mrs. J. W. Sauer, Mrs. C. W. Coulter and Dr. J. Lückhoff.

Your Society was represented on a Committee appointed to inaugurate a memorial to the late Dr. Marloth. This Committee has concluded that the most suitable memorial would be the establishment of a reserve fund for Chemistry and Botany, such fund to be administered by the South African Association for the Advancement of Science.

As the result of an interview with His Honour the Administrator, instituted by this Society and accompanied by 10 other kindred Societies, the Administrator has agreed, after consultation with his Advisory Committee, to proclaim the whole of Table Mountain a Nature Reserve extending up to Constantia Berg. Further representation has now been made to the Divisional Council of the Cape to include the Constantia Berg, Noord Hoek and Kalk Bay Mountains in the Reserve. The thanks of the Society are due to the Council for having given every assistance to the object in view. It is understood that the matter will in due course be laid before His Honour the Administrator.

JOURNAL.—During the year the seventeenth volume of the Society's Journal was published under the editorship of Professor Compton, Director of the National Botanic Gardens. The Journal still commands the highest praise from kindred Societies all over the world. Constant demands are made for it; consequently it has been found necessary to increase the issue this year.

ANNUAL GATHERING OF MEMBERS.—The Annual Gathering of members took place at Kirstenbosch on Saturday, 3rd October, 1931, and was very well attended by members and their friends. (After tea had been served, the company was addressed by the President of the Society, Sir James Rose-Innes, after which Professor Compton spoke on the general progress of the work at Kirstenbosch. He paid a high tribute to Mr. Mathews, the Curator, for his work in connection with the Succulent Garden which is now one of the most attractive features of the Gardens, the cost of construction being defrayed by your Society from its Life Members' Fund.

Further application has been received from the Trustees for £200 for the completion of this work, which application will be considered at a meeting to be specially called.

The Brochure published last year by the Cape Peninsula Publicity Association in conjunction with the Railway Pub-

licity Department, has been the means of interesting many visitors to the Peninsula from Overseas in the Gardens, and it has proved of very material service to Kirstenbosch in other ways.

Correspondence ensued between the Council and Lady Graham, with regard to the establishment of a Nature Reserve at Grahamstown, and it is gratifying to record that chiefly owing to Lady Graham's efforts, the Town Council of Grahamstown has agreed to set aside a large area for the purposes of a Nature Reserve, to be administered by a local Committee.

The annual list of Seeds available for free distribution was sent to members in January.

During the year, the Gardens distributed to Members of the Botanical Society and to other Institutions, 521 lots of material, this comprising 4,715 Packets of Seed, 22,379 Cuttings, 16,417 Seedlings and Plants, and 1,985 Bulbs.

The total number of contributions to the Gardens during 1931 was 2,483 lots, this comprising 655 Packets of Seed, 1,556 Cuttings, 6,167 Plants, and 18,115 Bulbs.

The Annual Report and Balance Sheet of the National Botanic Gardens was distributed to Members in May.

The number of Visitors recorded as entering the gates at Kirstenbosch on Saturday afternoons, Sundays and Public Holidays during 1931 was 48,647, this being 2,751 more than in 1930.

OBITUARY.—The Council much regrets to report the loss by death of Sir Max Michaelis, a Vice-President of the Society, of Miss Dorothea Fairbridge, a Member of the Council, and of Sir David Graaff, Bart., and Mr. John Garlick, Life Members of the Society.

THANKS.—The Council has to express its indebtedness and sincere thanks to Mr. R. L. McDonald for having audited the Accounts, to Professor Compton for his valuable aid in connection with the Editorship of the Journal, to the City Council for use of rooms for Meetings, and to the Press for their kindly assistance in reporting the affairs of the Society.

LIONEL PHILLIPS,
Chairman.

BALANCE SHEET AS AT 31st DECEMBER, 1931.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Life Members' Fund 1/1/31	355 0 0		Post Card Publications at Cost	58 10 0	
Added during year	100 0 0		*Less* Special Fund donated by Mr. J. B. Taylor	50 0 0	
		455 0 0			8 10 0
Subscriptions paid in advance		30 19 0	South African Milling Company, Deposit on Call	400 0 0	
Specialty Press of South Africa		101 10 4	Accrued Interest	6 2 10	
National Botanic Gardens, surplus for 1931		783 2 3			406 2 10
			Union of South Africa, 5% Stock 1929/39 at Cost	300 0 0	
			Accrued Interest	4 7 1	
					304 7 1
			Cape of Good Hope Savings Bank, plus Interest		334 5 10
			Sundry Debtors, for Advertisements in Journal	27 15 0	
			Other Debtors	5 15 0	
					33 10 0
			Cash at Bank		283 15 10
		£1,370 11 7			£1,370 11 7

REVENUE AND EXPENDITURE ACCOUNT FOR 12 MONTHS ENDED 31 DECEMBER, 1931.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
General Expenses		49 10 8	Subscriptions:		
Clerical Assistance		30 0 0	Ordinary	667 19 8	
Bank Charges and Exchange		8 12 10	Family	160 9 0	
Stationery and Printing		24 12 5	Associate	89 12 8	
Annual Gathering at Kirstenbosch		22 17 6			918 1 4
Journal, 1931	84 9 8		Sale of Journals		8 6 6
Less Advertisements	27 15 0		Interest		39 11 6
		56 14 8	Donations		9 11 0
Surplus for 1931		783 2 3			
		£975 10 4			£975 10 4

Audited and found correct,
R. L. McDONALD, *Auditor.*
Cape Town, 29th March, 1932.

(Signed) LIONEL PHILLIPS, *Chairman.*
(Signed) FRANK E. CARTWRIGHT, *Hon. Treasurer.*

List of Members of the Botanical Society.

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary. P.O. Box 267, Cape Town.

A.

Abbey, W.
ABBOTT, W. C.
Aberneihy, Miss O.
ADAMSON, PROF. R. S.
Ailsa, Marquis of
Ainslie, Miss F.
Ainsworth, Colonel J.
AKERMAN, CONRAD
Albrecht, C. W.
ALBU, SIR GEORGE, BART.
Alderson, Miss D.
Alexander, A.
Alexander, Miss E.
ALEXANDER, MRS. G.
ALI, H.H. PRINCE MOHAMED
ALICE, H.R.H. PRINCESS, COUNTESS OF ATHLONE.
Allison, J.
Allison, Mrs. J.
Allister, R.
Anderson, Mrs. A. Murdoch
Anderson, Mrs. C. L.
Anderson, Dr. C. T.
Anderson, E. B.
Anderson, Mrs. T.
Andersson, E. J.
Andersson, Mrs. E. J.
Appleyard, Mrs.
Apsey, T. J.
Arbuthnot, Miss I.
Archbell, Mrs. J. E.
Arderne, H. R.
Arkwright, Dr. J. A.
Armstrong, C. W.
Armstrong, Mrs. W. H.
Arnold, Dr. G.
Arnot, Miss
ASHTON, DR. M. L.
Askew, F.
Augustus, I. S.

B.

Babbs, A. T.
Babbs, Mrs. A. T.
Bacon, Lt.-Col. A. D.
Backhouse, J. S.
Bahlcke, Miss W.
Baillie, Mrs. B. M.
Bain, W. G.
Bain, Mrs. W. G.
Bairnsfather, K. C.
Balfour, A. P.
Ball, W. R.
Ballantine, Dr. A. J.
Banks, Mrs.
Barclay, Miss E.
Barker, Miss W.
Barlow, W.
Barnard, Prof. T. T.
Barnes, E.
Barnes, Mrs. H. R.
Barnes, S. R.
Barr, P. R.
BARRETT, P. N.
Bartlett, Miss G.
Basson, Miss M. M.
Basson, N. J.
Bates, J. T.
Battenhausen, C. F.
Battenhausen, J. W.
Battenhausen, Mrs. J. W.
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BAXTER, MRS. W. DUNCAN
Bayley, Miss
Bean, D.
Bean, H. E.
Beard Miss H.
Beard, H. R.
Beard, Mrs. W. A. M.
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Beattie, Lady
Beck, Lt.-Col. A. A.
Beck, Mrs. A. A.
Beck, F.
Beck, Lady Meiring
Beck, T. E.
Becker, Mrs. D.
Becker, T.
Bedford, H. J.
Beechey, Rev. T. J. J
BEECROFT, E. E.
Beecroft, W. I.
Behr, C.
Bell, A. B.
Benjamin, Hon. Mr. Justice L. E.
Bennet, H.
Bennet, Mrs. H.
Bennett, A.
BENNING, A. F. J.
BENTINCK, VICE-ADMIRAL SIR RUDOLF
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Bernard, Mrs.
Berry, H. O. W.
Bertie, Hon. A. M.
Bertish, H.
Bertram, Mrs. M. E.
Beverley, Miss M.
Bevis, A. L.
Bingham, Mrs. H.
Bisset, W. M.
Blackbeard, Miss G. I.
Blackburn, H. W.
Blake, Mrs. A. S.
Blake, H. G.
Blakeney, J. M.
Blathwayt, Mrs. G.
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Boast, Miss D.
Bock, Miss S.
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Booth, C. O.
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Bosman, Mrs. I. D.
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Bowen, W. M.
Bowie, Miss M.
Bowles, W.
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Boyd, Mrs. M.
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Brandmuller, E.
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Buchan, Col. C. Forbes
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Buller, A. C.
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BURMEISTER, MRS. A. H.
Burns, A.
Burtt Davy, Dr. J.
Burtt Davy, Mrs. A.
Burton, Mrs. H.
Butcher, H. J.
BUTCHER, W.
Butler, W. B.
Butters, J. T.
Byng, Viscountess

C.

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Calderwood, Mrs. J.
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Callaghan, Miss B. G.
Campbell, Mrs. F. M.
Campbell, Miss K.
Campbell, Mrs. W.
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Cape Peninsula Publicity Association
Cape Town Training College
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Cartwright, J. Stewart
Cartwright, Mrs. J. Stewart
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D.

Dahlem Botanical Museum
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Dale, Miss V.
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Dockrall, Mrs. A. W.
Dockrall, T. A.
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Erydenberg, Mrs.
Eitmann, Rev. E. C.
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Evans, Hugh
Evans, Miss S.
Everitt, W.
Evetts, Miss L. B.
Eyles, F.

F.

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Ferguson, H. C.
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Finch, Miss B. A.
Finch, J. R.
Findlay, G. M.
Findlay, G. Stuart
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Fleischmann, Mrs. L.
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Ford, Mrs. L. D.
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Foxwell, Mrs. A. D.
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Friedlander, Mrs. A.
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Frudd, H. W. D.
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Fuller, Mrs. E. B.
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G.

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Galpin, F. H.
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Garland, Miss M.
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Garnett, G. S. B.
Gavin, Major F. C.
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Geyer, Mrs. A. L.
Gibson, Mrs. W. P.
Giffen, M. H.
Gill, Dr. L.
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Glennie, Mrs. E.
Glyn, L. C.
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Goodman, J. A.
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Graham, Miss E.
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Grey University College, Bloemfontein
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Groves, C. S.
Groves, Mrs. C. S.
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Guthrie, Miss L.
Gwayde, J.

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Hall, Mrs. H.
Hall, Mrs. Vine
Hall, Dr. W. J.
Hamilton, Mrs. D. A.
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Harsant, Mrs. Sidney
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Harris, Mrs. C. C.
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Harrison, Mrs. M.
Hart, M.
HART, MRS. N. M.
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Harvey, W. D.
Harvey, Miss
Haumann, J. S.
Hawke, W.
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Haymes, Mrs. M. C.
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Hazell, R. W.
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Heald, Major D. C.
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Henderson, Mrs. J.
Henderson, W. H.
Hennessy, Sir A. T.
Henshilwood, Miss N. G.
HENSHILWOOD, MRS. T.
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Herman, Dr. C. L.
Herman, G. H.
Hermans, H. W.
Herrman, Mrs. L.
Herz, L.
Hewat, Dr. Bennie
Hewat, Mrs. M.
Heyman, Sir Melville
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Heyneke, Mrs. P.
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HIRSCHORN, F.
Hitchings, Rev. W. W.
Hitzeroth, L.
Hoare, C.

Hobson, J.
Hockly, D. E.
Hockley, R. A.
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Hoey, H. G.
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Hofmeyr, S. J.
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Honey, Thos.
Hooper, H. C.
Hooper, V. E.
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Howorth, Mrs. E.
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Hugo, Dr. D. de V.
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Hull, Miss M.
Humby, A. J.
Humby, Mrs. A. J.
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Hunt, W. P.
Hunter, D. A.
Hunter, J.
Hunter, S. J.
Huntington Botanic Gardens, California.
Hutchinson, Miss P.
Hutchinson, R. W.
Hyland, C. W.

I.

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Jenkins, Miss S.
Jenkinson, Capt. R. C.
Jeppe, Dr. T.
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Jex-Blake, Lady Muriel
Joffe, C.
John Innes Horticultural Institution
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Johnson, Rev. W. R.
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Jones, Mrs. W. F.
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Joubert, Miss L. J
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Juffernbruch Miss L.
Juritz, Dr. C. F.

K.

Kannemeyer, D. V.
Kannemeyer, Mrs. D. V.
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Katzin, A. G.
Keay, Miss M.
Keeble, Lady
Keegan, W.
Keith, Capt. D. R.
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Kemp, Miss C. L.
Kemp, Mrs. J.
Kendall, F. K.
Kent, Mrs. T. P.
Ketchen, Dr. A. D.
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Key, A. C. H.
Key, K.
Kidman, Mrs. E.
King, Miss F.
King, F. E.
King, T. J. B.
Kingon, Miss H. A.
Kingon, Miss I.
Kingsley, C.
Kingswell, Miss E.
Kingwilliamstown, Girls High School,
Kirkpatrick, Miss B. H.
Kladler, J.
Klubert, A.
Knacke, F.
KNIGHT, MRS. C. H.
Knight, C. M.
Knight, Mrs. Herbert
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(*a*) To encourage the inhabitants of South Africa to take an active part in the progress and development of the National Botanic Gardens at Kirstenbosch, a part of the Groote Schuur Estate, in the Cape Province, and to induce them to appreciate their responsibilities therein.

(*b*) To augment the Government grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch.

(*c*) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

(*d*) To enlighten and instruct the members on botanical subjects by means of rambles, meetings, lectures and conferences, and by the distribution of literature.

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Book Reviews.

RUDOLF MARLOTH: *The Flora of South Africa*, Vol. III, sections I and II. pp. 349 and xx; plates, 50 coloured and 20 monochrome; figures, 125; map, 1. (Cape Town, Darter Bros. and Co.; London, Wheldon and Wesley, Ltd.)

Marloth's monumental work on the South African flora has now been completed by the publication of the last of the four great volumes of which it is composed. The first volume saw the light as long ago as 1913, since when there have been exasperating delays due to war conditions, a disastrous fire at the publisher's, the pressure of multifarious work upon one to whom idleness was unknown, and the almost endless back-and-forth references between the author in one hemisphere and the printers in the other.

The second volume appeared in 1915 and the third in 1925. The last volume had been written and was in an advanced stage of printing when Marloth died suddenly at Caledon; and though he thus missed the visible consummation of his labours, it may perhaps be thought more fitting to his ever-active personality that he should die while in the act of producing his magnum opus rather than having laid it aside as complete.

"The Flora of South Africa" is one of the strangest books ever composed, unique both in form and substance. It is not a "Flora," but it is a book about a flora; and a recognition of this aim would have obviated some of the rather unmerited criticism that the work has suffered. From the botanical point of view it is a summary of the genera only of South African plants, and only a selection of the more striking species are mentioned, usually because the author had some special comment to make upon them.

The book is indeed an astonishing miscellany, crammed with the author's personal observations and with the sifted harvest of wide reading and original study and experiment. One plant suggests a note on geographical distribution, another the biography of some traveller whose name it commemorates, another some feature of structure in relation to habitat, others mimicry, mode of pollination, drought resistance, medicinal or esculent qualities, parasitism, relation to agriculture, or some personal anecdote. Every comment is fresh and stimulating, and bears the imprint of Marloth's endlessly interested mind.

Sometimes he becomes more discursive than is altogether justified, as in his remarks about the olive or in his curious and lengthy digression about Rousseau, a subject to which he even added in the appendix. The book is entirely incoherent, and yet it coheres by reason of the intense gusto and enthusiasm for the South African flora and the South African scene that was the author's dominant characteristic.

And if the text with its wealth of original observation and suggestive comment fascinates the reader, the illustrations charm him by their beauty and by the skill of the photographer — Marloth himself in most cases — and of the artists who prepared the coloured plates and drawings.

Never was a botanical book so well illustrated as this; yet no one can say it is a mere picture-book, for the text and illustrations are constantly *en rapport* and their joint purpose is to display the beauty and wonder of the plants which live around us.

Marloth's nature-philosophy appears on every page. He is definitely among the adaptationists, though he makes no pronouncement as to how the adaptations of plants to their environments come about — the question of questions in biological thought. Someone inspired by the horrific grapple-fruit of Harpagophytum had written of "desperately and ingeniously cruel Nature." No, says Marloth, "that view is purely anthropomorphic — Nature is not cruel — only efficient." On the much-discussed subject of mimicry he pours scorn on the armchair biologist. "There are people," he says, "who declare that protective mimicry is a mere theory. Let them go forth into the veld or up the mountains and learn to see."

Everywhere he sees the perfection of the relationship between the plant and its habitat: but this perception is not the fireside theorising of those whose imaginings have brought adaptationism into some disrepute. For if his advice was to "go forth into the light of day," we can truly say that "first he folwed it himselve."

It is only natural that Marloth towards the end of his long life should have been in some ways *laudator temporis acti*. For great changes have come over the vegetation of the Cape Province within the span of his lifetime owing to the spread of civilisation, with its road-making, widening agriculture, commercial forestry, destructiveness and vandalism; and also what can only be considered as the negation of civilisation, the practice of constant veld-burning which is destroying at once our flora and the natural fertility of our country.

Marloth recurs again and again to this abomination. Of the exquisitely beautiful Ventricosa Heath, he writes: "In spite of the havoc which a century of veld-burning has produced in the flora of the Franschhoek mountains, one may still come across some islands of original vegetation where rocky walls have offered a barrier to the fire and enabled small patches of these plants to persist." The Berry Heath, he says, is "frequent in the south-west, at least in places where the veld fires have not swept the ground too often and thus eradicated it."

The Red Erica can sprout from the base after burning — a very unusual feature, but for which "the ever-recurring veld-fires would have eradicated it long ago

from the Cape Peninsula and allowed it to survive only in a few specially protected refuges, as is the case with some other equally showy kinds that have not acquired this mode of recovery."

Marloth was primarily a botanist of the Cape and Karoo floras, and he is at his happiest in describing and annotating the plants of these regions. There were few corners of the western Cape Province that he had not visited, and in his book one appreciates the ubiquity of the man and the arduousness of his travels to the remote localities which he mentions so nonchalantly.

Considering the size of the book and the difficulties involved in its production, it is remarkably up-to-date. One notes, for instance, the mention of Lloyd's recent work on the mechanism of the insect-trap of Utricularia, and Van der Riet's discovery of the wax-content of the rhenoster-bush. An appendix to this final volume, moreover, includes numerous additions and emendations to all four volumes, and Mrs. Levyns has incorporated therein some of the most recent developments with regard to new genera.

Marloth was fortunate, and South Africa is fortunate, that his enthusiasm and knowledge should be enabled to take a form worthy of himself and of his subject. In his preface to the concluding volume he expressed the indebtedness of himself and of his readers to " the two patrons of the book, viz., Lady Phillips, the prime mover in the undertaking, and Sir Lionel Phillips, who generously came to our aid when the world war, and later on a conflagration at the London warehouse, threatened to prevent its completion. The keen enjoyment that thousands have derived from the pages of the book and the inspiration that many have received for seeking a deeper knowledge or acquiring a greater appreciation of our flora, will be their reward."

To this all who know the book will assent. It is all too rarely that scientific work is allowed the scope that wealth can give it. And it is probable that in no other way can generosity produce so great a benefit to mankind as in endowments of this kind. South Africa is grateful to Sir Lionel and Lady Phillips for thus collaborating with Rudolf Marloth and making possible a work which so brightly illuminates our land and its incomparable flora.

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J. Burtt Davy: *A Manual of the Flowering Plants of the Transvaal with Swaziland.* Part II: Malvaceae to Umbelliferae, pp. xxxv. + 260; text-fig. 40. London: Longmans, Green, 1932. Publisher's price, 25s. 0d.

The first part of Dr. Burtt Davy's Transvaal Flora was published in 1926 (see review in Part XII of this Journal). We are now able to welcome the second part, which, as planned, brings the work to the end of the Archichlamydeae. The six years interval has been due to the author's arduous work in building up the Department of Forest Botany at the Imperial Forestry Institute, Oxford, and other educational duties, which have left him without leisure for the Transvaal Flora. It is greatly to be hoped that the more advanced organisation of his Department will allow him greater freedom to proceed with the two further parts of the Flora which will complete this valuable work.

Part II follows closely the lines of Part I. An attempt has been made to reduce the number of abbreviations, but the text is still unnaturally condensed. The type is very clear, but the format, which is that of a pocket-flora, is small for a book which is mainly a work of reference for the herbarium. The citations, localities and other details are very full and will greatly facilitate determinations and monographic studies. The system adopted of giving the descriptions of the species and groups in the form of analytical keys is an excellent one for convenience and economy of space. The plan followed with regard to new species, however, is inconvenient and uneconomical. Their diagnoses are out of place in a full flora and should have been published separately in a systematic journal so that they could be cited in the Flora as in the case of older species. The inclusion of the Latin diagnoses separately disturbs the sequence of the Flora. Moreover full English descriptions are given later in the text, so that valuable space is used unnecessarily and discrepancies have crept in. For example in the genus Indigofera, *I. Schinzii N. E. Br.* was described in Latin both in Part I p. 44 and in Part II p. xxiv, and in English in part II p. 372, as well as taking its place in the clavis on p. 366. Again *Indigofera reducta N. E. Br.*, described in Latin in Part I p. 44, is not mentioned in Part II and has presumably been dropped. In the case of *Myrica Mossii, Burtt Davy*, neither Latin nor English description is available.

Dr. Burtt- Davy had the assistance of collaborators in some of the more troublesome genera, namely Dr. N. E. Brown, Mr. J. Hutchinson, Mr. C. A. Smith, and Miss I. Verdoorn. The line illustrations which are of high technical quality are the work of Mrs. Burtt Davy, Mr. W. E. Trevithick, and the late Miss Matilda Smith; arboreal species are mainly chosen for the benefit of forest officers.

A great amount of valuable information is included as to the economic qualities and uses of the various species from the author's own observations as well as from other sources.

When completed Dr. Burtt Davy's book will be a standard and indispensible work, and will be an important landmark in the scientific study of the South African flora.

N. E. Brown, A. Tischer, M. C. Karsten: " *Mesembryanthema.*" Edited by E. J. Labarre, 7½ in. x 10 in., pp. xxvi + 323. 2 Coloured Plates and 180 Illustrations. Ashford, England: Reeve. 1931. Published price, 36s. 0d.

This fine book is symptomatic of the great awakening of interest in the South African succulent flora which has occurred in recent years. In Holland, Germany, the United States and South Africa many collections of our

indigenous succulents are being built up, and intensive study is being given to the various groups. Until a few years ago, moreover, the only succulents known to the amateur were the American Cactaceae: but the realisation in Europe and America of the existence of the South African succulents has enormously extended the scope of his hobby and made him acquainted with a hitherto undreamt-of series of extraordinary forms of plant life. Stapelias, Haworthias, Kleinias, Euphorbias, Aloes, Gasterias, Crassulas and many other groups have their own students and enthusiasts: but the vast group of the Mesembryeae stands pre-eminent in its appeal both to specialist and amateur, on account of the wealth of species it includes and their astonishing forms in which beauty is combined with bizarrété in endless ways. All through the group we find that the plant is built up on the elementary "decussate" plan, with pairs of equal opposite leaves of simple form, each pair being set on the stem at right angles to the preceding pair: and from the shrubby types in which this arrangement is obvious we can trace every intermediate to the stone-like and bloated Pleiospilos Bolusii, the many species of Lithops in which the whole year's growth consists of two curiously-shaped leaves partially fused together, the Conophytums in which the fusion has gone further and produced an almost spherical plant with an insignificant slit at the tip, and, most remarkable of all, Muiria Hortenseae where the fusion is so complete that all semblance of a leaf-pair is lost and the flower has to burst its way out by a violent rupturing of the tissues. In some the leaf-pairs are unequal as in the Gibbaeums, in others they are "staggered" as in Dactylopsis: some are beautifully marked, others are fringed with grotesque teeth or studded with nodules: in the Psilocaulons the leaves have almost disappeared and the stems have become thick and green: and the variations of form are endless. And while it is the curious and unique vegetative features which chiefly attract the collector, the flowers are almost always of charming form and beautiful and vivid colouring, and the fruits fascinate by their mechanism and their geometry.

The book under review deals mainly with the so-called stemless or dwarf species, and makes no pretence to completeness. 146 species are illustrated by photographs of the living specimens or by water-colour drawings, and each is accompanied by a few explanatory notes, for which Dr. N. E. Brown is responsible. The photographs vary much in merit: most are of magnificent quality, but some are poor or are taken from unhealthy specimens. Practically all of them represent pot-plants grown under glass in Europe, but in most cases the typical form of the plant has not seriously changed as a result of cultivation. Several species of Conophytum have been figured, described and named in the absence of flowers, a proceeding all too frequent among specialists in succulents.

In addition to the descriptions, chapters on the General Ecology of these plants and on their cultivation are included. The chapter on Ecology is written by Miss Karsten, and is largely a compilation from the various writings of Marloth and others, special attention being given to the subjects of Mimicry and Windowed Plants. This brings the somewhat scattered and inaccessible literature of the subjects into convenient form for the European reader, and whets the appetite for further critical studies in the field of what are among the most fascinating problems in biology, and whose solution has vital bearings on evolution and adaptation. It may be hoped that South African readers more favourably placed than the author for studies of this kind may be inspired to contribute to real knowledge as distinct from casual observation of these subjects.

Dr. Tischer writes on the cultivation of Mesembryeae and has many useful remarks to make on a subject too little understood by gardeners: the individual peculiarities of each species, the need for alternate growing and resting periods — the latter a great stumbling block to cultivators and a fruitful cause of failure, — and other topics are dealt with. The European grower is chiefly thought of, but how much better ought not we to succeed in South Africa with our more propitious climate and our greater facilities for studying the plants' natural habitats! And yet Dr. N. E. Brown in a letter mentions that some of his plants date from 1876 and a few from 1862: how many South Africans have kept a Conophytum growing for seventy years?

The book is trilingual — English, Nederlands and German. It is beautifully printed and bound, and the whole enterprise of its production reflects credit on M. Labarre's enthusiasm.

J. M. Watt and M. G. Breyer-Brandwijk: *The Medicinal and Poisonous Plants of Southern Africa*, pp. xx + 314. Plates: coloured, 12; black-and-white, 14. 1932. Edinburgh: Livingstone. Publishers' price, 25s. 0d.

An incredible number of indigenous plants are used medicinally by the Bantu and in a less degree by the Hottentot and Bushman races. Some are known to be definitely poisonous; others have more or less pronounced physiological effects; in other cases the imagination plays an all-important part in the choice of medicaments; and others are charms of magical virtue only. The European colonists have adopted some of the native remedies and have added others to their popular pharmacopoeia. Many of these enjoy a local reputation for which pharmacological study can find no justification. Out of the vast number of South African plants of which medicinal use is made very few have found their way so far into the European and American Pharmacopoeias, which are built up largely on a northern hemisphere tradition. Modern pharmacological tests act as a barrier to the still further inflation of the gargantuan feast of popular northern remedies which has been spread before a credulous and doctor-ridden public.

Among the host of hope-awakening potions dear to native and European alike some few may yield the alkaloids and glucosides which can be obtained in a state of

purity, expressed in a neat chemical formula, weighed out exactly, and dosed to standard animals whose reactions can be recorded by mechanical apparatus. The modern pharmacologist sceptically applies this kind of criterion to the plants which are said to be " good for cancer " or " splendid cures for anything wrong with the chest ".

This book represents a compilation of a vast mass of scattered and erratic information which is being interpenetrated, leavened and destructively digested by the enzyme of scientific investigation. It presents, moreover, a valuable summary of recently-acquired knowledge of plants causing pathological effects in stock animals. The illustrations are mainly of plants which act as stock-poisons and animals suffering from their effects.

From the botanical point of view it may be mentioned that the more intensive are the studies of local floras the more local races of widespread "species" are distinguished: and the pharmacological qualities of these local races may be totally or quantitatively distinct. Consequently it is of the utmost importance that the actual material employed in any pharmacological test should be preserved, preferably in a herbarium, together with full notes of its provenance, dates, etc. The botanical names used in this book often represent vague systematic entities, and it is satisfactory to learn that material is being filed for reference in all possible cases, as only in this way can future research be assisted, and apparent discrepancies resolved.

An important part of the book is the full and careful indexes, occupying 88 pages, under Botanical Names, English and Afrikaans names and Names of Diseases, Native Names, and Active Principles. The native names are indexed both with and without prefixes.

The authors may be sincerely thanked for a book which is a valuable compilation including many new data, a guide to the scattered literature and a stimulus to future investigations.

International Address Book of Botanists. 5½ x 8¾ in. p. 620. London: Ballière, Tindall & Cox. Publishers' price, 12s. 6d.

The International Botanical Congress which met at Cambridge two years ago (see this JOURNAL for 1930) passed a resolution establishing a Committee to arrange for the preparation and publication of a new Address Book. " Dorfler " published in 1909 was out-of-date, and a new directory was needed. The Committee consisted of Professor Diels of Berlin, Dr. Merrill of New York, both Directors of great Botanic Gardens, and the late Dr. Chipp, assistant Director of Kew. The Bentham Trustees assisted the financial side of the undertaking by a loan, and the Carnegie Corporation of New York made a grant towards it. The collection of information, which had to be done entirely *de novo*, was carried out by a number of collaborators in the different countries. The result is an impressive volume giving particulars under each country of botanical societies, institutions wholly or chiefly botanical, universities etc. with botanical departments, and of individual botanists, their posts, qualifications and special interests. The index of botanists contains about 11,000 names. The space allotted to the U.S.A. is 138 pages out of the total 568; the U.S.S.R. has 74 pages, and Great Britain 46. The Union has 4½ pages, the first entry being The Botanical Society of South Africa, Kirstenbosch, Newlands, Cape Province. The book is well printed, of convenient size and reasonable price, and will be valuable for reference for many years to come. It is to be hoped that future editions will be issued, perhaps to synchronize with each quinquennial international congress.

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THE JOURNAL OF THE

BOTANICAL SOCIETY

OF SOUTH AFRICA

Edited by R. H. COMPTON
M.A., F.R.S.S.Af., Director of the
NATIONAL BOTANIC GARDENS

Part XIX. 1933.

KIRSTENBOSCH,
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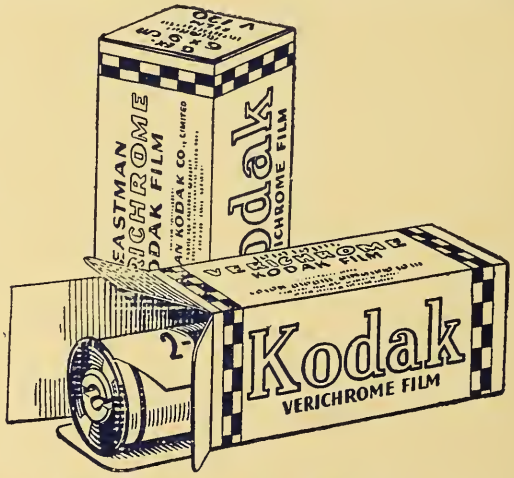

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PLATE I. Encephalartos cycadifolius at Kirstenbosch: the new crown of fronds and the old.

The Journal of the Botanical Society of South Africa.

EDITED BY R. H. COMPTON.

PART XIX 1933

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News and Notes.

THE Botanical Society has continued to grow in spite of the depression of the last two years, though its growth has naturally been restricted in consequence.

The gains of membership have more than compensated numerically for the losses, however, and this may be considered very satisfactory in the circumstances. The following table shows the growth of the Society during its 20 years existence: alternate years only being quoted (see previous issues of the Journal).

	Life.	Family.	Ordinary.	Associate.	Total.
1914	33	22	264	33	352
1916	49	26	264	45	384
1918	49	28	281	78	436
1920	54	45	384	237	720
1922	55	52	418	301	826
1924	62	57	455	313	887
1926	65	60	481	341	947
1928	66	54	581	345	1046
1930	71	76	718	414	1279
1932	72	79	746	446	1343

* * * * * *

One of the chief natural glories of Kirstenbosch is the Silver Tree. These unique and lovely trees, known to everyone in South Africa and famous all over the world, grow in profusion in the Gardens area. They regenerate very freely from seed, are of quick growth and tend to form dense groves. Their permanence as a feature of the Cape Peninsula would be assured but for two over-masteringly powerful adverse factors — the spread of alien trees such as pines, hakeas, stinkbeans, blackwoods, and other wattles, and the prevalence of bush fires. The latter factor indeed renders the former much more formidable, for the germination and spread of the alien trees is definitely favoured by fire.

Under the stress of these factors the Silver Trees disappear at an alarming rate, and a policy of laissez-faire in the Peninsula would result in the complete extinction of the Silver Trees in fifty years. Large areas on the slopes of the mountains formerly occupied by Silver Trees are now dominated by pines, and the fate of the remainder is certain unless definite steps are taken by those responsible to relieve them of the destructive competition under which they are succumbing.

* * * * * *

The Trustees of the National Botanic Gardens, realising the way in which the Silver Trees, as well as other parts of the indigenous vegetation of Kirstenbosch, are being threatened by the invasion of alien trees, have determined to tackle the problem and have embarked on a scheme which it is anticipated will in time make Kirstenbosch the home of the finest Silver Tree forest in existence. The cost of this work is very considerable — about £10 per acre in the case of badly infested ground in the first year and about another £10 per acre spread over the subsequent four or five years. The whole cost of the scheme for restoration will be close on £1,000, of which half should be spent in the first year. The Trustees obviously cannot devote so large a proportion of their very limited funds to this purpose, and they will therefore be grateful for donations to what they regard as most important work. The sooner and the more drastically this problem of weed infestation is dealt with the less costly it will be and the more satisfactory the results. There could be no better example of the truth of the proverb that he gives twice who gives quickly. Contributions towards the " Save the Silver Trees " fund may be sent to the Director, and will be most gratefully received.

* * * * * *

The experiment has been tried of exhibiting a collection of South African wild flowers and plants in London. The enterprise involved an enormous amount of work and organisation on the part of the collectors in the country districts as well as at Kirstenbosch and Whitehill and in private gardens, the naming of the plants (largely done by the staff of the Bolus Herbarium), careful preparation and repacking at the Cape Town Public Gardens, shipment at the correct temperature, building of rockeries and setting up of the display at the Horticultural Hall. The organisation reflects great credit on Mr. Williams, the Assistant Town Clerk, Cape Town, and Mr. van den Houten, Director of Parks and Gardens, Cape Town, to whom we offer congratulations on the Lindley Medal bestowed by the Royal Horticultural Society in recognition of the work. The plants

— including a valuable collection of succulents from Whitehill — are being presented to the Royal Botanic Gardens, Kew.

* * * * * *

The London Show received a fair amount of attention in the London press, and was seen by large crowds of people, and there is general praise of the boldness of the enterprise and the care and skill with which it was carried into effect. A few phrases from the leader in *The Gardeners' Chronicle* may be quoted, without comment. "No praise can be too high to commend the admirable staging of the exhibit. It was Kirstenbosch come to London, and the only thing which was missing from the view of the range of mountains which formed the background of the main display was the quivering movement of the Silver Trees as the sunlight falls upon their leaves . . . . All that wonderful collection of South African plants — the Proteas, the rosy-pink Protea cynaroides and the pale pink flush of the Blushing Bride, Serruria florida, most appositely among the rarest of plants — the orange and salmon-orange colours of the Leucospermums and all that galaxy of strange and rare blossoms, owe their supreme beauty to the lack of any garishness of colour . . . . What a natural garden the Cape Province is any who visited the exhibition may know, and those who have visited both the exhibition and the Cape will for ever wonder why, with such native wealth of floral loveliness, Cape gardeners should insist on planting many of our plants the flowers of which cannot vie with those with which Nature dowered South Africa. To see the Garden of Kirstenbosch is alone worth the journey, and for the lovers of the curious and marvellous there is the Karoo Garden, where all the pebbles look like plants and all the plants like pebbles . . . . The great and legitimate pride which all South Africans take in the most precious of all their possessions — the most wonderful flora in the world."

* * * * * *

The object of the London Exhibition was publicity. It was hoped to attract visitors from England to South Africa. Possibly the Exhibition may have this effect, though it is very difficult to induce visitors to come here in September, the season of wild flower shows. As for the inducement held out to visitors of seeing the country thickly covered with wild flowers — such as are so alluringly depicted in the brochure published in connexion with the Exhibition — we fear that many will feel they have been misled. Apart from local displays of tulps and chincherinchees and — in places that happen not to have been burnt recently — of some Proteas and small-flowered Heaths — the ordinary visitor to the Cape will see little to correspond with the expectations that have been roused. If he happens to be here at the right moment, and if it is a good season, and if he is willing to go off the beaten track and away from the hotels to which it is hoped to attract him, then he will be rewarded by scenes of unforgettable beauty. But the ordinary visitor to the Cape who sticks to the main roads will chiefly see wheat-fields, pine plantations, wattle thickets, rhenoster bush, and the mountains defaced by fires. Agriculture, forestry, flower-picking and veld-burning have disposed of "our incomparable flora". South Africa is of intense interest botanically, but our hotel-keepers would starve if they had to rely on the visits of botanists. More visitors may be attracted here by the prospects of seeing a "blaze of flora", but we fear that the kind of conflagrations they will witness in our vegetation will be hardly edifying to them and will leave them with a very dubious opinion of our common sense and of our appreciation of the flowers we take such pains to advertise.

* * * * * *

Rightly considered, it is foolishness for us to be proud of our wild flowers. They were here long before we were. The principal result of our arrival is that they have diminished enormously in abundance, in some cases to the point of extinction. Our love for and pride in them takes the form of plucking and digging them up: the flowers we pluck are prevented thereby from seeding; the bulbs and plants we dig up for the most part perish in our gardens. There are large elements of local rivalry and commercialism even in our wild flower shows.

We should only take a pride in our flora if we are doing something to preserve it. When our love for our flowers takes the form of national parks and reservations of veld for their protection in every district; when we can restrain our itching fingers from grabbing wild flowers for ourselves "because we are so fond of them", or from buying them "because they were picked already and if we don't somebody else will"; when we adequately support the constructive work that is being done at Kirstenbosch and Whitehill in the attempts to save something out of the general ruin; then we shall have reason for pride in the floral treasures that are our good fortune to possess and our duty to preserve.

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The International Conference for the Protection of the Fauna and Flora of Africa drew up a Convention which was signed by the representatives of nine countries concerned in Africa (including the Union of South Africa) and now awaits ratification by the various governments. The preamble states that one of the methods by which preservation of fauna and flora can best be achieved is " by the constitution of national parks, strict natural reserves, and other reserves within which the hunting, killing or capturing of fauna, and the collection or destruction of flora shall be limited or prohibited " . . . . " In all cases where the establishment of national parks or reserves is possible, the necessary work shall be begun within two years from the date of entry into force of the Convention, and where such establishments are impracticable at present, suitable areas shall be selected as early as possible for ultimate adoption." The vital necessity of National Parks in South Africa has repeatedly been emphasised in this Journal, and the Botanical Society was among those bodies which joined in an earnest request to the Government to establish one or more National Parks in the Cape Province. Such Parks should not merely be game reserves, but should serve for protection of flora as well as fauna. There is little doubt that the Union Government will ratify the Convention, and it is sincerely to be hoped that the early establishment of National Parks in the Cape Province will follow..

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Good progress is being made with the Grahamstown Nature Reserve founded a year or two ago. The Editor had the opportunity of visiting the Reserve recently, and was greatly struck by the variety and interest of the flora as well as by the beauty of the site. The Reserve is now adequately fenced and the encroaching pine-trees are being removed. Botanical survey work is in progress and records are being obtained which will be of great value in years to come. The Reserve itself is likely to be one of Grahamstown's most valuable features, and one only wishes that a much larger area could have been secured so as to save, for instance, some of the sheets of heaths—more " Western Province " than most of the Western Province itself — which are being rapidly smothered by the pines.

The Grahamstown City Council and the Committee in charge are to be heartily congratulated on the very successful beginning they have made with a scheme that is an example to other towns in the Union.

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The Government has expressed its determination to tackle one of the most vital problems in the country, that of soil erosion. In its aggravated form, the phenomenon of soil erosion is a direct result of our systems of veld management, both Europeans and natives being to blame, — no doubt under the stress of economic needs and overpopulation. Much of the soil and veld deterioration and loss which is so calamitous a feature of the Union to-day is, however, due to careless exploitation of natural resources and a complete indifference to all but the immediate future. Now there are very few areas left to exploit and farmers are suffering from the mismanagement of their predecessors in the same farms, with no opportunity to trek away to find new pasture lands or game. The loss of soil is appalling, the destruction of veld is incredible, droughts find the farmers without adequate resources, rains are destructive rather than beneficial, farms are losing their value, poor-whitism and spoon-feeding are the order of the day. The Government is endeavouring to save something from the wreck, and to help the farmers to make the reconstructive efforts that are needed. Whether the farmers will respond to the exceedingly generous terms that are being offered them remains to be seen.

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The Government scheme, however, remains merely palliative if the root causes of soil erosion are not taken into account. These are two in number. One is overstocking, and the Government is alive to this evil and constantly urges farmers to avoid it. The other is the practice of veld-burning, and here the Government is silent. In large areas of the Cape Province veld-burning is the main cause of erosion and all its attendant evils: there is no overstocking. In other parts of the Union veld-burning combines with overstocking to produce deplorable effects. Yet the subject is apparently taboo to the Government. Perhaps we may quote the very wise words of Dr. Viljoen, Secretary for Agriculture. He writes: " To tackle one phase of the matter and neglect another would in the long run mean so much time, labour and money wasted." If this is realised, why neglect the problem of veld burning? Further, " In fighting erosion the mere damming of a sloot is not sufficient. What is of vital importance is, generally, to control the run-off by means of contour banks, etc." Does the " etc." include the abstention from burning the veld? There is nothing to indicate that it does; yet the anti-erosion campaign will be " so much time, labour and money wasted " if the Government continues to shy at the veld-burning problem.

By the sudden death in November of Sir Drummond Chaplin the Botanical Society has sustained a serious loss. Sir Drummond Chaplin joined the Society in 1919. In 1924 he was elected a member of the Council and became Chairman shortly afterwards. On the death of Sir Max Michaelis in 1931 he was elected to fill the vacancy among the Vice-Presidents. He attended the meetings of the Council as often as his manifold duties permitted, and assisted the Society greatly with his wise counsels. He had an enthusiastic interest in the plants of the Cape, and one of his chief anxieties was the preservation of the native flora on his mountain estate at Noord Hoek. He is buried on the slope of the mountain he loved to climb and among the vegetation he strove to protect.

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The late Herman H. Bolus did much to assist in the establishment and development of Kirstenbosch, especially in the early stages of the work. He bought and presented the Cape Chestnuts for the purpose of planting the avenue, and also many of the original trees in the Fern Dell. These came largely from the gardens of Dr. T. R. Sim, and the first ones were planted by Lord and Lady Gladstone. He also assisted various pieces of work by donations of money. After his death his collection of succulent plants, bulbs, etc., was presented to the Gardens by Mrs. Frank Bolus to whom he bequeathed it.

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Lady Keeble (Lillah McCarthy) who visited South Africa with Sir Frederick Keeble in 1930 writes of Kirstenbosch in her recently published book "Myself and My Friends". "Every day that I was there I would go to what I think must be the most lovely garden in the world, the botanic garden at Kirstenbosch . . . . in Kirstenbosch all the numberless flowers of the Cape Peninsula are assembled. It is one gigantic rock garden, with the sheer cliffs of Table Mountain for a background, and the rocky outcrops of the mountain spread out like sheltering wings. Trees and shrubs and lesser plants accompanied by little rivulets run all the way down the mountain into the valley below . . . . Chief among the beautiful plants that grow at Kirstenbosch are the silver trees, the leaves of which are of a beautiful silvery white; they glisten in the sun and dart about like white butterflies in the breeze. . . . "

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Mr. Keith Cowlisham of Sydney, N.S.W., Australia, has for many years been carrying on breeding experiments with various South African bulbous plants, and has sent an article which he thinks may be of interest to members of the Botanical Society. Undoubtedly it will, and we print it with pleasure as an example of work of which there is an enormous amount to be done, and which is certain to yield results of the greatest interest and value from the horticultural point of view. The Gladiolus industry —founded entirely on South African species—has reached astonishing proportions as the result of hybridisation work. Hybrid Freesias — South African again — are developing rapidly. Innumerable Montbretias have been developed from South African ancestors. Valuable Watsonia hybrids have been produced in Australia from Cape species, Barberton Daisies, Ixias, Pelargoniums, and many more, swell the list of the South African plants which in their cultivated and hybridised varieties have brought beauty to gardens all over the world, and prosperity to those who grow them. How much of this development of South African flowers has been effected in South Africa? Practically none of it. It is incongruous to import Gladioli from Europe into South Africa, buying back with our money the floral wealth that once grew at our doors; but it is worse than incongruous to make no attempt to develop the great floral wealth that we still possess. At Kirstenbosch we have the "raw material" for this work — the native species: we also have ideal conditions for carrying it out. When shall we have a department of hybridisation attached to the Gardens?

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An article published in this part of the Journal will give members and other readers a summary of the work that has been carried on at Kirstenbosch for many years on the cultivation of economic plants and the extraction of their products. The article emphasises the potential value to South Africa of the results which have been obtained, and points out the necessity for carrying the work a further stage. This can only be done through the provision of funds and equipment, the present resources of the Gardens being insufficient to permit of anything but small-scale experimental work. The work of Botanic Gardens has again and again led to most valuable and profitable developments in many countries. It is only necessary to mention quinine, rubber, tea, tung oil, pineapples, cocoa, sisal, — though the list could be extended considerably — as examples of plants in whose introduction and culture Botanic Gardens have played an integral part. The indications are that

Kirstenbosch can give material help to South Africa in a similar way, if it is properly assisted in the preliminary investigations.

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Mr. J. W. Mathews, Curator of Kirstenbosch, contributes two articles to this Journal on subjects of great interest to those who grow South African plants in their gardens. The phenomenon of deferred germination is very widespread in the Cape flora, and is far from being thoroughly understood: Mr. Mathews' notes will throw a good deal of light on this baffling garden problem.

The difficult question of providing summer colour in Cape gardens by means of indigenous plants is Mr. Mathews' second topic. Gradually the progress of the collections and work at Kirstenbosch is showing how this can be done, and what plants are suitable in various situations for filling the gaps left by the passing of the brilliant spring flora. Mr. Mathews' article will be a valuable source of information to those interested.

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The Flora Capensis, that monumental work on the South African flora, the first volume of which was published in 1859, has now reached completion with a slender supplement on the Gymnosperms, that is to say, those seed-bearing plants which are not flowering plants in the ordinary sense, viz. the Conifers, the Cycads and Welwitschia. A review of this publication will be found on page 26 of this Journal. We take this occasion to print photographs of some of the Kirstenbosch Cycads. The frontispiece represents one of the splendid group of *Encephalartos cycadifolius* (formerly known as *E. Frederici-Gulielmi*) producing its glorious crown of new fronds: the male cones of the previous year are seen just below, and below these again are the fronds of the year before. Plate II shows *Stangeria eriopus*, whose stem is subterranean, bearing its few fern-like fronds and a cluster of male cones: and another specimen of *Encephalartos cycadifolius* with four woolly female cones approaching maturity. The Kirstenbosch South African Cycads are by far the most remarkable collection of these plants in existence, and form one of the most important features of the Gardens. The collection has recently been enriched by the gift, by Colonel Molyneux and General Wylie, of several specimens of the newly-discovered Kosi Bay Cycad, *Encephalartos kosiensis*. These plants have developed their first crowns of leaves satisfactorily, and the production of the cones, which are of a brilliant salmon-cerise colour, is awaited with great interest.

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The Botanical Society has recently decided to give recognition and support to the Karoo Garden at Whitehill. An article explaining the new arrangements and the revised Constitution of the Society will be found on later pages. Members are strongly urged to give their hearty personal support to the new scheme which it is anticipated will be to the benefit of both Kirstenbosch and Whitehill.

We include two photographs taken at Whitehill, which, owing to the character of its climate and soil is specially suited for the natural cultivation of succulent plants. One shows the rare and curious *Huernia Pillansii* in flower: the other shows the stone-like *Pleiospilos Bolusii*, the "Kafir-hut" *Euphorbia obesa*, and a Gasteria.

Whitehill is open to visitors on week days during working hours, and is now accessible without serious difficulty by car, the turning off the main road, two miles east of Matjesfontein, being marked by a signboard. Whitehill railway station adjoins the Garden.

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The Edward Muspratt Solly Scholarship has been held during 1932 and 1933 by Miss G. Joyce Lewis, B.A., (Univ. of Cape Town) who has been engaged in work on the systematics of the Iridaceae and some other groups at Kirstenbosch and the Bolus Herbarium. The Scholarship for 1934 has been awarded to Miss Elsie E. Esterhuysen who will take up a course of research work at Kirstenbosch. Miss Esterhuysen is a former student of the University of Cape Town where she has recently taken the degree of M.A. in Botany.

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The Botanical Society was founded on 10th June, 1913, and Kirstenbosch passed into the hands of the Trustees on 1st July, 1913. The year 1934 will therefore witness the "coming-of-age" of the Gardens and the Society. Consideration is being given to methods of celebrating this auspicious event. In the meantime, there is one way in which each member can make a valuable coming-of-age present to the Society, and so to the Gardens — by securing the enrolment of at least one new member. If every member would do this — and everyone probably has friends who are not yet members and who only need the subject to be mentioned to be willing to join — then the membership roll would be quickly doubled, with enormous benefit, direct and indirect, to the Gardens.

The Botanical Society Recognises Whitehill.

OPPORTUNITY FOR MEMBERS.

WHEN the National Botanic Gardens were founded by the Government in 1913, in response to a unanimous resolution of Parliament, Kirstenbosch was adopted as their site. Indeed, Kirstenbosch and the National Botanic Gardens were regarded as synonymous for several years. The Botanical Society came into existence simultaneously, and in its constitution Kirstenbosch is specifically designated as the object of its support. During the 20 years which have elapsed the Botanical Society has rendered ever-increasing support to Kirstenbosch through grants for development and maintenance derived from the subscriptions of its Members and Associates.

From the outset, however, the possibility was contemplated that other gardens might be established for special purposes in other parts of the Union under the same authority, namely that of the Trustees of the National Botanic Gardens. The first and hitherto the only special garden of this kind was adopted by the Trustees in 1921, when they took title to the Karoo Garden at Whitehill with a view to the cultivation under karoo conditions and the study of the flora of the more arid portions of South Africa.

The Trustees have administered Whitehill on a completely independent footing from that of Kirstenbosch, their policy being that no funds should go to Whitehill to the prejudice, direct or indirect, of Kirstenbosch. For this reason no Government or other public grant in aid of Whitehill has hitherto been asked for. The Botanical Society, moreover, has been precluded by its constitution from giving any direct assistance to Whitehill.

It has been felt, however, that the time has come for the Botanical Society to recognise the Karoo Garden, and to find some means of giving it assistance without interfering with its autonomy and without diminishing the support given to Kirstenbosch. In the twelve years since its establishment Whitehill has thoroughly justified its existence. It has contributed greatly to the knowledge of the South African succulent flora: it has fostered interest in these plants and has introduced many of them to cultivation in many countries of the world: it is one of the very few desert or semi-desert botanical institutions in the world and has acquired a widespread fame. Its funds are exceedingly small.

The question of the best method by which the Botanical Society should be enabled to give support to Whitehill without detracting from that given to Kirstenbosch has been carefully considered, and the Society at a special General Meeting on 19th September, 1933, resolved to alter its constitution to enable it " to give general recognition and support to the Karoo Garden, Whitehill and to any other Garden that may be established by the Trustees of the National Botanic Gardens, to make grants to the Trustees in aid of such Gardens, and to receive subscriptions as may be determined by the Council with a view to obtaining funds for such grants-in-aid."

The Council decided that Members who wish to do so should be able to subscribe not less than ten shillings annually, in addition to their usual subscription, and that the additional funds so obtained should be used for supporting the work at Whitehill, after deducting five per cent. towards the cost of administration of the Society.

Members of the Botanical Society have for several years enjoyed the privilege granted by the Trustees of being able to obtain a share of the surplus seeds available for distribution at Kirstenbosch. Among these seeds, however, succulent plants have never figured to any marked degree, and it has therefore not been possible to accede to the wishes of Members who are interested in this special class of plants. The Karoo Garden at Whitehill is mainly devoted to growing succulents, and the seeds of a number of species will now be available for distribution on request to those Members who pay the additional subscription: while their privileges with regard to Kirstenbosch seeds will remain as before. The Trustees have decided to distribute ten packets of Whitehill seeds, as chosen from the appendix to the seed list, to Members paying the additional subscription. That is to say, for example, an Ordinary Member paying the extra subscription would be entitled to 20 packets of Kirstenbosch seeds and 10 packets of Whitehill seeds annually.

The Society is confident that a large number of Members will take advantage of the new opportunity of sup-

porting the work at Whitehill and of sharing in the seeds therefrom, and that many new Members will be enrolled, to the benefit of both Kirstenbosch and Whitehill.

Members will be invited individually to support Whitehill, as well as Kirstenbosch, by participating in the new arrangements. The annual seed-list circulated to Members will contain an appendix of succulent seeds from Whitehill for the use of those who pay the additional subscription. Members are strongly urged to give the new scheme their valuable assistance.

The revised Constitution of the Botanical Society is printed below.

THE BOTANICAL SOCIETY OF SOUTH AFRICA.

CONSTITUTION.
(Revised, November, 1933).

Name:—

1. The Society shall be called "The Botanical Society of South Africa."

Objects:—

2. The objects of the Society shall be:—

(a) To encourage the inhabitants of South Africa to take an active part in the progress and development of the National Botanic Gardens at Kirstenbosch, the Karoo Garden at Whitehill, and any other Garden that may be established by the Trustees of the said National Botanic Gardens; and to induce the said inhabitants to appreciate their responsibilities therein.

(b) To augment the Government grants towards developing, improving and maintaining fully equipped botanical gardens,. laboratories, experimental gardens, etc., at Kirstenbosch and to make grants to the Trustees in aid of any Garden referred to in the preceding subsection.

(c) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

(d) To enlighten and instruct members on botanical subjects by means of meetings, lectures, conferences, and by the distribution of literature.

Membership:—

3. The Society shall consist of persons who have signified their assent to be members thereof and who have paid the required subscription.

4. There shall be five classes of members:—

(a) Honorary Members.

(b) Life Members subscribing not less than £25.

(c) Family Members subscribing not less than £2 2s. 0d. per annum.

(d) Members subscribing not less than £1 1s. 0d. per annum.

(e) Associate Members subscribing not less than 5/0 per annum.

Associate Members shall enjoy the privileges of membership, but shall not vote at any of the meetings of the Society. Honorary Members may be elected at a meeting of the Society on the nomination of the Council.

Any member of the classes (b), (c) or (d) aforesaid desirous of specially assisting the Karoo Garden at Whitehill and of sharing in any special privilege which the said Trustees may duly confer in respect of such assistance may subscribe an annual amount of ten shillings in addition to the subscription above prescribed for the class to which he belongs. The amount of such additional subscription less five per cent. for cost of administration shall be devoted to the support of the Karoo Garden at Whitehill.

Management:—

5. The organisation shall consist of a President, not more than three Vice-Presidents and a Council consisting of 20 members, all of whom shall be chosen annually at the Annual General Meeting of the Society. The President and Vice-Presndents shall be ex officio members of the Council.

Any member of the Council resident more than 100 miles from Cape Town shall have the right to appoint an alternate (who must be a member of the Society) to represent him at any meeting of the Council at which he is unable to be present.

6. The Council shall have full control of all the affairs of the Society, and shall have power to appoint a representative or representatives of the Society, as may be required, to act with representatives of the Government and such other bodies as may be agreed upon, as Trustees

Photo: R. H. Compton.

PLATE II. a. Stangeria eriopus with male cones at Kirstenbosch.

Photo: R. H. Compton.

PLATE II. b. Encephalartos cycadifolius with female cones at Kirstenbosch.

of the National Botanic Gardens; and to frame such rules and regulations as may be thought to be fit for the conduct of the business of the Society. Such rules and regulations shall not come into force until approved by a General Meeting of the Society.

Meetings of the Council:—

7. The Council shall meet in Cape Town at least once a quarter. Quarterly meetings shall be held in the first week of March, June, September and December, or at such other times as the Council may decide. One week's notice of all meetings with agenda or the business to be discussed shall be given to each member of the Council.

Quorum:—

8. Three members shall form a quorum of any meeting of the Council.

Funds:—

9. The Council shall have sole power to deal with all funds payable to the Society, but at the commencement of each financial year shall make a fair estimate of what sum will be required to carry on the work of the Society, and fairly and fully carry out all its objects, and shall grant the remainder after deducting the nett amount of subscriptions earmarked for the Karoo Garden at Whitehill subject however to the payment of any grant specially made to Whitehill in terms of Section 2 (b) hereof, to the Trustees of the Gardens for advancing the objects for which the gardens at Kirstenbosch are established.

All subscriptions from life members shall be invested and only the annual income from the same shall be paid into the General Fund, until such time as the capital sum may be required for some permanent improvements at Kirstenbosch when the Council shall have the power to pay over the capital sum to the Trustees; provided that a majority of members of the whole Council shall have agreed thereto at a meeting duly called.

Annual General Meeting:—

10. The Annual General Meeting of the Society shall be held in March of each year at such time and place as the Council may determine after giving to members fourteen days' notice and a copy of the agenda.

Business at the Annual General Meeting shall be:—

(a) Annual Report of the Council.

(b) Financial Statement.

(c) Election of President, Vice-Presidents and Council of Representatives.

(d) Consideration of notices of motion (such notices shall be submitted to the Council three weeks prior to the date of the Annual General Meeting).

No other business than that on the agenda shall be transacted.

Any member, however, after the transaction of the business on the agenda, may, with the permission of the chair, bring forward any matter for discussion without previous notice being given.

11. The quorum of all General Meetings, special or otherwise, shall be 10.

If a quorum be not present the meeting shall stand adjourned, until such time and place as the Council may determine.

The President for the time being, or in his absence one of the Vice-Presidents, shall preside at any General Meeting and if the President and Vice-Presidents be absent the meeting shall elect one of the members to be Chairman.

Special General Meeting:—

12. A Special General Meeting of Members may at any time be called by the Council and shall be called at such time as the Council may decide on the receipt of a requisition to the Council signed by at least 20 members. Such requisition shall state specially the reason for such meeting and the matters to be discussed. If no quorum be present the matter shall drop.

No other business than that for which the special meeting is called shall be transacted.

Change in Constitution:—

13. The constitution shall in no way be varied, altered or annulled, except by a two thirds majority of the members present and voting at an Annual General Meeting or at any Special General Meeting called for the purpose and in either case one month's notice of a motion so to vary, alter or annul the constitution shall be given.

RULES.

1. The financial year of the Society shall be from the 1st January to 31st December.

2. Members' subscriptions are due and payable on the 1st January in each year, and must be payed by the 30th September, provided that new members joining the Society after September 30th in any year, and having paid their subscriptions will not be liable for any further subscriptions until the end of the following year.

3. Any member who wishes to resign from the Society must give notice of his intention to do so on or before the 31st December in any year.

4. The Council shall have the power to refuse or cancel membership. In case of membership being cancelled the member in question shall have the right to appeal to the whole Council.

5. The Council shall elect from amongst their number a Chairman, Vice-Chairman, Honorary Secretary, and Honorary Treasurer and shall have power to appoint sub-committees for any special object and to delegate to such sub-committees the functions and powers of the Council relating thereto.

6. Any member of the Council absenting himself from the Council for four consecutive meetings without leave shall vacate his seat. The Council may grant leave of absence to any of the members of the Council for such period as the Council may deem fit.

7. In the event of any vacancy occurring on the Council after the annual appointment by the Society the Council shall have the power of filling such vacancy.

8. One or more auditors shall be elected annually, at the Annual General Meeting or at such other meetings as may be called specially for the purpose, who shall examine the books and accounts of the Society and report thereon annually. Should no auditor be elected or should any vacancy occur, the Council may nominate the auditor or fill any vacancy.

9. There shall be at least two ordinary meetings of the Society in each year for the reading and discussion of papers and other communications on subjects of botanical and horticultural interest. At least one of these shall be held at Kirstenbosch.

10. No addition or alteration shall be made in the rules of the Society except by resolution at a General Meeting, and after not less than one month's notice of such addition or alteration.

Experiments in the Cross Fertilization of certain species of the Amaryllidaceae.

By KEITH COWLISHAW.

FIRST of all I might say, as an introduction to these few notes, that I first started these experiments more than twelve years ago from a horticultural and not botanical point of view, and it was only as the results appeared that I became more and more attracted by the botanical aspect of them, that is to say the botanical relationship of various plants as shown by the possibility of their cross fertilisation.

I am setting out here the species I experimented with and the results of the crosses. The experiments are as yet too incomplete to allow me to draw any inference from the results as to the relationship of plants, but I might say this, that some of the results have been surprising; some species considered of the very closest relation refuse to cross, others, placed by botanists in separate genera, produced fertile hybrids while others produced only mules.

In these few notes I will mention only the genera in which I have been successful in carrying on the cross for some three generations. The Amaryllidaceae are about the most wearying of plants to experiment with in this way, for seldom do they flower from seed under four years and in many cases take very much longer.

All seed is raised under glass, and set out in its growing quarters the following year. I obtain about 95 per cent. germination where the relationship is very close, but where it is very remote every seed that grows is carefully treasured.

My most successful experiments from the horticultural side has been with the Clivias. These experiments also afford an interesting demonstration of the effects of line and inbreeding.

I possessed two species when I commenced these experiments viz. *C. nobilis* (orange-red form) and *C. miniata* (an orange form). These were crossed both ways, and the resulting seedlings (of which there were some seventy-five) flowered in about five years. The seedlings from

the original cross were of a vigorous type and in most cases more robust than their parents, and often produced flowers markedly larger than either of their parents. The colour varied little, as was to be expected, being without exception orange-red. I certainly thought I would obtain some variation as I understood there are various colour forms of both these plants found growing wild.

The flowers compared with those I possess now were decidedly ugly and with narrow perianth segments as in their parents, with pointed tips. From these I selected those with the widest segments and the roundest ends, also the most vigorous and largest flowers and crossed them.

The seedlings resulting from these secondary crosses were a very marked improvement on their parents. Not only were they even more vigorous than their parents, but they attained to a flowering state in about four years from the sowing of the seed thus clipping off a period of one year from the flowering time of their parents.

Some of these flowers, compared with their grandparents, were truly remarkable. From this batch of some three hundred plants I selected 25 sorts of exceptional merit horticulturally. In this batch had appeared the perfectly symmetrical flower with large broad overlapping perianth segments all of one size with nicely rounded tips and a reflexed habit. The range of colour had increased, but not to the extent I had hoped or even anticipated. No pale flowers appeared, though certainly one of a deep bright brick-red colour stood out as a marked acquisition. For the most part they were still orange-red with good deep yellow eyes, though in some the yellow is more or less replaced with pure white. A few were of a lighter shade of orange-red such as one might describe as orange-pink.

The best of these seedlings and to date the best I have raised had a head of flowers on it standing this year 30 inches high, perfectly globular and composed of 20 large flowers all open at once. The individual flowers were some five inches across, perfectly round and reflexed. It caused no little comment when exhibited at the R.H.S. show on the 6th inst.

From this series I had raised another batch, all of which were "selfed." Here I was astonished to find that whereas a plant would set seed with the utmost freedom to pollen from another plant, even though it came from the same berry, (I have had as many as 10 from a single berry) I found that "selfed" they set seed badly, and when they did set it I never obtained seed from the same berry to the extent of more than two.

Some of these latter seedlings have now flowered in their third year from the sowing of the seed. Those which have flowered are dwarf plants with slender stems and pendulous starry flowers all very much alike. They attain a height of not more than 15 inches and make attractive pot plants. These dwarf types appear fixed and have now flowered two years in succession. Is it possible that the species of Clivias as we know them are of hybrid origin, and these are a throw back to an older and now lost species?

Others of this batch which flowered at the fourth year while very vigorous in growth have reverted to the starry form of *C. nobilis*, and one can hardly tell them from the original plant from which they sprung. There are still others to flower (to the extent of some two hundred plants) and some of these are showing remarkable variation in foliage, for whereas neither of the original plants possessed foliage above 1½ inches wide some of the unflowered plants, which are already 4 ft. high possess foliage quite 5 inches across.

I find Clivias the easiest of plants to grow, and one might almost say the worse they are treated the better they respond. Mine are all growing in bush houses in pots, for I find that when their roots are potbound they always flower the best. You would be astonished at the small quantity of the soil necessary to support them, and the amount of dry conditions they will stand. They grow equally well in the garden, though if set out in full sunlight the flowers will not push up above the foliage and so their beauty is lost.

Seed takes a year to ripen and when ripe will remain on the plant another twelve months if so allowed. When ripe the berry containing the seed is as large as a walnut, and of a bright scarlet colour, and I might say equally attractive as the flowers. Germination after sowing is slow but sure and when once up the plants grow with fair rapidity. As to soil, any seems to grow them well. If grown in pots it is necessary to use a light compost and perfect drainage.

The next genera I experimented with were the Amaryllis, Brunsvigias, and Crinums. To start with, I possessed *A. belladonna* good pink variety, *Brunsvigia multiflora*, *B. m. rosea*, and *B. m. alba;* later on *B. Josephinae* and a hybrid raised by the late H. B. Bradley known as "Haythor" and reputed to be a cross between *A. belladonna* and *B. multiflora alba*. This I doubt for the the reasons you will see later. Of African Crinums I possessed and still possess only *C. capense* and *C. Moorei*.

I first of all crossed *A. belladonna* with each of the three varieties of *Brunsvigia multiflora* each way and obtained a good quantity of fertile seed, but in crossing " Haythor " I could obtain no seed from it though its pollen is very potent. I later on ascertained that Mr. Bradley himself found " Haythor " to be only partly fertile, and never obtained seed from it though he so tried for many years.

The resulting seedlings were very disappointing, mostly taking after *B. multiflora*, though a few took after *A. belladonna*. The colour variation was not great, and one would have great difficulty in finding more variation in this batch than in any other batch of *belladonna* or *multiflora* seedlings.

But I found this, that all the hybrid seedlings were fertile and set seed with the utmost freedom. Also that they were of very rapid increase.

I accordingly selfed these, as I could not see any advantage to be gained by crossing them, and the resulting seedlings which flowered some six years ago are very interesting indeed. Some have attained to a great size in flower stalk, size of flower and the number of flowers to a head. Also the colour variation of the flowers is very great. Some are of the deepest carmine-pink, others of a pure glistening white with a yellow eye, like Haythor, but without the wavy petals of that variety. In all the flowers I have selected as being worthy of propagation, the segments of the perianth are round, of equal size and slightly reflexed.

Some of the flowers are a delightful blending of pink and orange, the latter colour which is present in all the seedlings in the form of an eye, having in these examples run up to the very edge of the perianth segments; others are of some shade of pink inside, but on the outside of the flowers picked out and streaked and stained bronzy brown. Others are of small stature, attaining a height of not more than 15 inches with small flowers of a soft pink shade. This latter type, while strong growing and vigorous, is easily smothered by its stronger neighbours in the seed beds, and so needs isolating as soon as discovered.

Another very interesting type has appeared in these seedlings forming perhaps 5 per cent. of the whole. These possess no flower stalk at all, but have large pink flowers of excellent form carried on the end of long peduncles, and as the leaves appear with the flower, give the plant for all the world the appearance of a giant pink crocus. So far I have been unable to secure any seed from these plants as the ovary is situated well down amongst the base of the leaves and so apparently cannot swell but their pollen is fertile and some seedlings from this are now being grown on.

Coming back to the hybrid " Haythor " I very much doubt the reputed parentage of this plant. All my experience has gone to show that any form of *multiflora* x *belladonna* is fertile and produces good seed. But here we have a plant which for a period of some ten years has absolutely refused to seed with me, nor has the ovary ever shown any indication of swelling. From its pollen, it is true, I have raised a number of seedlings of very inferior type, all white with the orange eye as possessed by the pollen parent. Unlike most of the hybrids of *belladonna* x *multiflora* crossed either way, Haythor has ruffled petals which gives it a decorative appearance. All the seedlings from its pollen are weak in growth and also will not set seed though their pollen too will produce seed on another plant. I am rather inclined to think Mr. Bradley was mistaken in its parentage, and that it is a particularly good form of *B. Josephinae* x *B. multiflora alba.*

I have raised hybrids between *A. belladonna* and *B. Josephinae* and *B. Josephinae* x *B. multiflora* crossed both ways. So far I am convinced that the first cross is quite infertile, it will not seed nor will its pollen produce good seed so far as I can ascertain. I have certainly had seed swell and ripen from the use of this pollen but it has been few and never will germinate. From the latter cross I have had a number of seedlings, which also will not set seed, though I think I have succeeded in effecting a cross back to *B. multiflora.* For the most part these are starry, pinched flowers, of a cerise-pink shade, but as I have never tried a cross on *B. m. alba* I cannot say that a white hybrid would not be possible. These latter experiments cannot proceed further owing to my inability to effect further crosses.

I have raised two seedlings, crosses between *Crinum capense* and *Brunsvigia Josephinae* and of this cross the bulb is the most imposing feature being some twelve inches across. They show no signs of increase. the flowers are of a pinkish shade and admittedly ugly. They are quite infertile. I have been unable to effect a cross with this Crinum by *A. belladonna* or *B. multiflora.*

I have raised many seedlings between *Crinum capense* x *C. Moorei*, *C. capense* x *C. latifolium*, *C. Moorei* x *C. pedunculatum* (this is our giant native species,) and have a large series of other interesting crosses coming along. Some good seedlings resulted from the *C. capense* x *C. Moorei* cross, dark pinks, being particularly good. *C.*

capense x C. *latifolium* gives typical *latifolium* leaves with its typical flowers, its freedom of flowering with the hardiness of *capense*, the colour variation is slight.

My best hybrid of Crinum is from the cross C. *Moorei* x C. *pedunculatum*, it is quite sterile, and is the result of over three years' attempt to effect the cross. I was quite convinced that they were too far apart in relationship. But eventually I obtained one seed which grew and flowered in four years and has since then increased with the utmost rapidity. It is extremely vigorous as I have generally found all sterile forms to be, with growth after the style of a dwarf *pedunculatum*: the flowers are large, *Moorei* type, of the pure glistening white of *pedunculatum*: they are carried on the end of long peduncles of the type of *pedunculatum*, and have opened on the 23rd of December each year, so we always have them for Christmas.

But with one cross I have had the strangest experience. For five years now I have been indeavouring to effect a cross between C. *pedunculatum* x C. *capense*. When using the latter as the seed parent every flower fertilised seems to take readily, the ovary swells rapidly and seems full of seed. Finally it attains to a size bigger than a clenched fist, turns yellow and one thinks here is a nice lot of seed. But opening it I find that it is one mass, that each seed has grown into the other, and the whole, which if they could be separated would comprise some sixty seeds or so, is quite useless. Occasionally there will be one in which the seeds do not cohere and can be separated, but though these do not rot as rapidly as do those which are all joined together, they will not germinate and so I have been unable to obtain a single seedling from this cross.

Crossed the other way I have obtained fertile seed but never had the seedlings existed more than two years being too weak in growth. All the coddling imaginable will not prolong their lives.

Crinums, Amaryllis and Brunsvigias grow well with us. As they make their principal growth during the Autumn and Winter months they are particularly at home here in Sydney where most of our 26-inch rainfall comes in the winter months. I find that they flourish in any sort of soil, and full sunlight or partial shade seems to suit them equally well. I have many of them growing at my week-end place 20 miles from here, where they are doing extremely well under the tall Eucalyptus trees (130 feet high).

I might mention that here the Cape Iridaceae do well also, the Freesias have spread all about beneath the tall gums, where the sunlight filters down to them through the leaves a hundred feet above them; on the flat in front towards the water's edge Sparaxis, Ixias, Babianas and the like are quite at home making a wonderful carpet of colour in the spring. Here they receive nothing but the natural rainfall, about 16 inches a year and all received between March and October with the exception of a thunder storm or so during the summer months.

I intend to make extensive planting as stock increases of other bulbs and hybrids.

I almost forgot to mention that an old road runs through the place disused these thirty years or more, and over its hard surface has spread *Anomatheca cruenta* which makes the old road a crimson sheet in September. It is so hard that the native plants have avoided it, but Anomatheca simply revels here and has spread little into the more fertile and lighter soil of the neighbouring bush.

Sydney, N.S.W.,
20th September, 1933.

Some Aspects of Soil Erosion.

By R. S. ADAMSON.

THE question of soil erosion has, during the last few months, figured fairly largely before the general public but it is no new problem.

Erosion and loss or wastage of soil have gone on in this country ever since human occupation or cultivation became at all fixed. In the early times the damage appeared small and the new land available almost endless, but with the increase of population and activity the available new areas soon became limited and the losses were forced on notice. There is no doubt that at the present time erosion and loss of soil have reached the stage of becoming a serious menace in the Union. It is a menace

that the Government has decided to tackle seriously. A comprehensive scheme has been put forth for collecting information, education of the public, combating the evil by assisting landowners with loans for reclamation and finally, by assisting research in the fundamental aspects. It is not at all necessary to go into any details of this national scheme. The press has already contained accounts. It is enough to emphasise that the very existence of such activity on the part of the Government is evidence that the problem is a serious one.

The erosion of soil, except in exceptional cases, only occurs when the vegetation covering the surface is destroyed or interfered with. In uninhabited regions the surface is remarkably stable. Soil erosion is thus basically a botanical problem.

The soil is the source of water and food materials for plants and also their foothold. The plants which build up the vegetation form the basis on which ultimately the whole continuance of the human race depends.

The soil consists of broken rock material and is penetrated by roots. These roots keep the soil mass together and increase its mass by penetrating deeper, working into cracks, and so on. In the soil physical and chemical changes go on and organic matter derived mainly from plants, is added, till finally the surface layers become very different both in structure and content from the rocks or rock material from which the soil was originally formed.

While the vegetation is untouched and active the formation of soil continues, sometimes rapidly. at others very slowly; but as soon as the plants are removed or destroyed the loose soil material is exposed to easy removal by wind, water or other agents.

In a country such as South Africa. where practically the whole is liable to extended periods of drought and where so much of the rain when it does come falls in heavy storms, erosion is especially liable to occur. The heavy rain falling on dry soil wets and loosens the surface and runs downhill. Unless the soil is held firmly by roots the sudden downhill movement of large quantities of water is liable to remove whole sheets from the surface. In other cases where the water runs off in channels, dongas, which may attain considerable depth, are cut out. These dongas cause great wastage of soil and themselves are a source of drying out of surrounding soil that often results in the death of plants and hence further wastage.

It is not proposed in the present note to attempt any sort of general account of the position in regard to soil erosion in the country but rather to treat very shortly some of the special aspects present in the South Western Cape region. This region differs in many ways from the remainder of the Union and in any scheme covering the whole country is apt to have its own problems treated as of minor importance in accordance with its proportion of area to the whole. For this reason these local problems are brought forward.

The South Western Cape is characterised by the rainfall being wholly or in very large part confined to winter months and the summer dry. Correlated with this climate the vegetation is very characteristic, being typically bush, not very tall, and generally with hard evergreen leaves predominantly of small size. Grasses and any turf-forming plants are infrequent or absent and hence grazing is not carried on to any large extent. The main agricultural value of the region is in fruit growing and grain production. The country is mountainous and the land of agricultural value is confined to the lower slopes and valleys and the coastal plain. In this region the losses due to soil erosion are less obvious than in many other parts but are none the less severe.

Erosion is worst on the mountains and as these are of little agricultural value, the loss has, up to the present, been either totally neglected or treated as of no serious account. It is true that the mountain vegetation, which is composed of bushes and reeds, is of little value as food for animals, and the soils too steep, too shallow and often too poor to justify cultivation. In an attempt to create pasturage the practice of burning the vegetation has gone on for centuries. Burning was carried out even before the advent of the white man, who has continued the habit. Several reasons are brought forward in support of the practice. The untouched bush is thick and most of the plants hard and woody. Animals find little to feed on and in the old days were liable to attack from easily concealed leopards or natives. When the bush is burned a certain number of the plants sprout up from underground portions that survive and the young soft shoots are much more palatable than the old hard ones. The apparent improvement is, however, of short duration. After two to four years, depending on local conditions, a dry bush cover, generally of low stature, is established. Not at all infrequently this re-established bush is again burnt in the hope of getting further improvement. But such recurrent fires, especially when combined with grazing, soon eliminate all but tough resistant plants of no economic value at all.

Fire destruction has other effects as well, effects that may mean serious ultimate loss. Fires most commonly

occur in summer and especially towards the end of the dry season when both bush and soil are dry. After the fire the soil, which may have been much heated, is exposed to the full drying effect of the sun and wind. This alone causes rapid alteration and often total disappearance of the organic matter in the soil which seriously reduces its nutritive value for plants and its capacity to hold water. The pale colour of the soils of recently burnt areas must be familiar. Under thick bush the surface layers of the soil are dark, often black, while after a fire the colour changes to white or very pale. This impoverishment of the soil by loss of organic matter renders the reappearance of the plants slower and more difficult.

The unprotected soil of a burnt area is exposed to erosion by wind or water. In the dry season winds remove the loose dry soil, especially in the upper portions of the mountains. When soil in large quantity becomes open to movement by wind action the establishment of plants may become very slow or even impossible.

Water in the form of rain is still more potent as an agent for erosion. The soil, no longer held by roots is washed down the slopes which may become so denuded that the solid rock alone remains: a condition too often seen on our mountains and especially in those with the heaviest rainfall.

After burning the vegetation is regenerated but the vigour of the new growth, its character, and the time taken for it to be formed, depend on the local conditions and the amount of erosion. Even under favourable conditions, when little soil removal occurs, the destruction has an adverse effect. One example must suffice, taken from an area that has been under observation for a number of years. This was on a granite soil on the slopes of Table Mountain. The angle of slope was not sufficient to allow of serious erosion. Before the fire the soil was covered by a dense growth of bushes beneath which were a number of shade tolerant species. Ninety-three different species were recorded of which fifty-one were woody plants. After the fire thirteen of these sprouted from still living underground portions; the remainder either re-started from seed or were totally destroyed. The area was kept under observation for seven years, during which time no further fire took place. At the end of the period the vegetation, as compared with the original, was lower and less dense. It contained a larger proportion of low growing woody plants with small leaves. The shade enduring plants, which have relatively large leaves, had mostly disappeared. The whole aspect was drier and less luxuriant: from the point of view of pasturage it was certainly less desirable.

This example was under favourable conditions. When these are less good the changes towards increased dryness are more pronounced and the time that elapses before regrowth is complete is extended. Very frequently fires occur before re-establishment and each fire has an increasingly deleterious effect, so that after very frequent fires the vegetation becomes sparse and largely made up of reeds, low bushes or bulbous plants which have no feeding value for animals and very little holding power on the soil and which produce very little soil improvement. The whole upper portions of many of our mountains are now in this condition though the general type of climate and moisture lead one to expect an especially vigorous vegetation. Fires followed by erosion by rain and wind have resulted in so great a removal of soil that only the most resistant plants which make little demand are able to survive.

People can and do say in this connection, — "Why bother about the mountains which are of no value as land; let us concentrate on the fertile low grounds." This is a very short-sighted view. The condition on the mountains has a decided influence on the slopes and valleys at the base; an influence shown in more than one way. The most important is on the water supplies, especially on springs and streams. When the vegetation is undisturbed and the soil well penetrated by roots and containing organic matter, the rain water penetrates. In part it is held, in part it percolates down and escapes in springs and streams. The percolation is gradual and the soil protected from loss of evaporation and hence the streams continue to flow evenly. On the other hand, when the vegetation is destroyed by fire the rains either remove the unheld soil or compact it. In either case the water runs off at once and little or none is held. The streams come down in flood but continue flowing for a short time only. Floods are very liable to occur in the low lands and the rush of water from above in addition to the ordinary rainfall causes dongas or other forms of erosion. Also in the sparse vegetation following fire such water as is kept in the soil is liable to be lost by evaporation.

Destruction of the vegetation has another serious effect on water supplies. The mountains here are frequently covered by mists brought up by the South East winds in summer. These clouds condense on the plants but only to a negligible extent on the soil itself or on rocks. The late Dr. Marloth demonstrated some years ago that the

condensation by bushes and reeds might reach an amount corresponding to several inches of rain. In unburned vegetation this reaches the soil and helps to keep streams running. When the vegetation is burnt it is wholly lost.

As the whole country is dependent on the mountains for its water supply it would seem obvious that a preservation of the vegetation on them is both urgent and essential.

University of Cape Town,
December, 1933.

Notes on Delayed Germination.

By J. W. MATHEWS.

IT is perhaps only natural when handling a large variety of plants, most of which have never been under cultivation before, to find they have peculiarities not generally met with in the general body of cultivated garden flowers. Until one has experienced a few "bumps" over one's anticipations and desires one is apt to cling to the usual orthodox ways and practice. When apparently viable seeds are sown, carefully attended to, and there is no germination, one does not get far by "dumping" after six or twelve months of waiting for results.

There is always the everpresent fear that seeds produced away from their natural associations and environment may be infertile. When apparently fertile seeds fail to germinate one must needs think about the climatic conditions prevailing during the various stages in the life of the plant, particularly from seed-ripening to the time one would expect germination to take place naturally.

I have the lesson of *Brachycarpea varians* in mind. Repeated sowings over a number of years were always failures under the usual nursery treatment of constant moisture, whether in the open, in the shelter of a frame, or under glass. Yet we had odd plants springing up around the garden, even when every seed was supposed to have been collected.

Having grasped at long last their dislike of our attentions they were subjected to entire neglect by standing them in the open on a sun-baked slope, where they remained hot and dry throughout the summer. Weeding was occasionally done.

On the advent of rain, and the consequent fall in temperature, a few seedlings germinated in May and June and were transplanted to where they were to flower. The same batch went through the same conditions the second and third years, with slightly better results. In the fourth year only an odd seedling or two came up, and the tins were afterwards dumped. With later batches it has been found that germination does not take place until the second winter when fresh seeds are sown. In July 1932, over 1600 seeds were sown in a bank fifty yards long and seven feet wide, mostly seeds of varying ages. In April 1933, over 1200 new seeds were inter-sown. So far, November 1933, only six seedlings have appeared.

Why all this persistent endeavour? Because the Brachycarpea is the most distinct, most elegant, most prolific, and most prolonged lavender coloured flowering plant in existence. It is an almost leafless virgate decumbent bush about two feet high, and up to four feet spread, with a life of four to five years.

From the second year the plant is a mass of graceful curving green twigs, each with five to seven flowers open at the same time, and each producing from twenty to thirty flowers. Its free flowering period extends from July to December.

A dwarf counterpart exists in *Cycloptychis virgata*, which differs in its erect, then depending, twigs, and purple flowers. It has the same deferred germination as the Brachycarpea.

The cheerful spring flowering annual, *Dorotheanthus* (*Mesembryanthemum*) *criniflora* also has this annoying character of lying dormant for three or four years after sowing. When plants are left to self-sow themselves a good crop of seedlings always appears in the first winter, and almost as many appear when the plants are collected for seed, yet these collected seeds fail to germinate for several seasons.

These results strengthen the ideas that the early matured seeds are the early germinating ones, or alternatively, that the long baking process to which they are subjected through the summer completed their maturation, and without which they are non-viable. Trials have been made with *Venidium*

Photo: R. H. Compton.

PLATE III. a. Huernia Pillansii flowering at Whitehill.

Photo: R. H. Compton.

PLATE III. b. Euphorbia obesa, Gasteria sp., and Pleiospilos Bolusii at Whitehill.

fastuosum of intermittent heat up to 139 degrees Fahr. without any noticeable improvement. More prolonged tests are necessary to decide.

Freezing has been recommended as practised to secure germination of various plants in Europe. It may do so with South African seeds, but one or more of their natural conditions are more likely to prove the controlling factors.

Actual temperature certainly controls the time of germination of many species, if not of families. Early sowings have been made in order to have young plants out as soon as rains have moistened the soil. Time after time only odd seedlings have appeared soon after sowing, yet when decent rains have fallen, and the days have shortened, a full 100 per cent. of the remainder have come up. This has been most pronounced with Leucadendrons and other Proteaceae, and to a lesser extent with Ericas.

This deferred or cycle of germination is apparently present in all types of vegetation native to the arid regions of the Cape. It is found in Spheroid Mesem's, Conophytums, Lithops, Pleiospilos, and other succulents; in annuals like Venidiums, Ursinias, Zaluzianskyas, annual species of Gazanias and Arctotis, etc., as also in perennial species of those genera. It may also account for the poor or non-germination of the many shrubs and the few trees native of those areas. It is definitely pronounced in Lobostemon.

Until more precise and exact knowledge of the controlling agencies is gained, the practice of retaining seeds over several seasons will have to be followed to make sure of establishing many species under cultivation. The shortest cut under our present knowledge is to sow the seeds soon after they are ripe, and allow them to stand throughout the summer without watering. When the days are shortening, say early in April, watering may be started with the prospects of satisfactory germination.

Trials were also made of storing collected seeds on a ridge shelf of a hot and dry succulent house. The results were indefinite as far as improvement was concerned, but neither were injurious results evident.

This incertitude will no doubt ultimately prevent many of our finest plants, annuals especially, from being generally adopted for world-wide garden decoration. Until these drawbacks can be overcome readily, they will but add zest to the endeavours of the keen growers of the unusual.

For Botanic Gardens with the aim, like Kirstenbosch, of bringing all native plants under cultivation the best procedure with the choicest species is to sow them thickly on a suitable spot, and reserve the place for them solely over a number of years, when they are likely to establish themselves, and ultimately provide a display annually.

Experience of repeated failures in transplanting many annuals is teaching us which species must be sown where they are to flower if the best results are to be obtained. As cultivators of South African plants, botanical as well as horticultural, we must have them all, and when a way is the most satisfactory, as well as the easiest, it must be followed.

The following are examples falling under this category: *Arctotis flaccida*, *A. leptorhiza*, and *A. venidioides; Dimorphotheca pinnata*, and *D. polyptera; Gamolepis annua*, and *G. speciosa; Cotula barbata*, and *C. leptalea; Heliophila azureiflora*, *H. diffusa*, *H. longifolia*, *H. pilosa*, and *H. variabilis; Gazania tenuifolia; Manulea Benthamiana*, *M. minor*, and *M. silenoides; Nemesia bicornis*, *N. azurea*, *N. pulchella*, *N. psammophila*, *N. macroceras*, *N. ligulata*, etc.; *Polycarena capensis; Phyllopodium capitatum; Sutera Dielsiana*, and *S. annua;* Ursinias, all small flowered species, some of which are charming dwarf free flowering plants for edging to taller ones; Venidiums, all annual species; *Wahlenbergia annularis*, *W. capensis*, *W. cernua*, *W. paniculata*, and *W. subrosulata; Zaluzianskya annua*, *Z. villosa*, and the new Polycarena-like *Z. collina.*

Not all are of sufficient merit for general garden cultivation, but some are outstanding, and when more amenable to cultivation, by selection or otherwise, will become general favourites.

Kirstenbosch,
November, 1933.

Work on Economic Plants at Kirstenbosch.

By R. H. Compton.

THE National Botanic Gardens were established in 1913 by the Government in response to a unanimous resolution of the House of Assembly. In its decision the House was influenced by a consideration, among other things, of the invaluable assistance that had been given to other countries by Botanic Gardens in respect of the introduction of economic plants, such assistance resulting in enormous additions to the country's wealth and prosperity. It was anticipated that Kirstenbosch would play a similar part in the case of South Africa.

Accordingly, work on these lines has been regarded by the Gardens authorities as one of the functions of Kirstenbosch, and they have endeavoured to carry out their duties in this respect to the best of their abilities. Unfortunately they have been severely handicapped throughout by lack of funds, and work on economic plants has only been possible at the expense of other no less vital functions. The only assistance that has been available for this work has come by way of small grants from the Research Grant Board to the Director personally, a gift of an experimental still and the loan of land through private generosity.

Owing to the inadequacy of funds available, the work has been necessarily carried out on a relatively small experimental scale. Moreover, the scope of work has been limited to certain classes of plants, especially medicinal and aromatic plants, which have usually been regarded as the special province of botanic gardens. Work on ordinary field crops, timber production, fruit growing and so forth has not been undertaken. Within these narrow limits certain results of considerable interest and potential value have been obtained. These have been reported in some detail to the Research Grant Board, year by year, but for the present purpose a brief summary of the work will be given.

I. In the first place there have been brought into cultivation at Kirstenbosch a very large number of species and varieties of plants of known or potential economic value. Some of these are indigenous to South Africa, others have been introduced from other countries. Every endeavour has been made to obtain the best varieties, and this has been achieved in many cases in spite of considerable difficulties. A list of the plants in cultivation in the Gardens is given below. They are carefully maintained from year to year, and the Gardens have always been willing to distribute free of charge to correspondents in the Union material of these plants for trial. Experimental work on these plants has been carried out in a few of the most promising cases, and this will be mentioned below.

ECONOMIC PLANTS CULTIVATED AT KIRSTENBOSCH, 1933.

MEDICINAL.

Agathosma apiculata.
„ microphylla.
Anethum graveolens (Dill).
Anthemis nobilis (Chamomile).
Artemisia absinthium (Wormwood).
„ afra.
Atropa Belladonna (Deadly Nightshade).
Barosma betulina (Round-leaf Buchu).
Barosma crenulata (Oval-leaf Buchu).
Barosma scoparia.
„ serratifolia (Long-leaf Buchu).
Barosma Peglerae.
Brachylaena elliptica (Bitterblaar).
Cassia fistula (Purging Cassia).
„ lanceolata.
„ occidentalis (Senna).
Chrysanthemum cinerariaefolium (Dalmatian Insect Powder).
Chrysanthemum roseum (Persian Insect Powder).
Cinnamon camphora (Camphor) Light oil yielding.
Cinnamon camphora (Camphor) Solid camphor yielding.
Citrullus colocynthus (Colocynth).
Coleonema pulchra.
Datura metel.
„ stramonium (Stinkblaar).
„ ferox.
Digitalis purpurea (Foxglove).
Dodonea Thunbergiana (Zandolien).
Empleurum serrulatum.
Glycyrrhiza glabra (Liquorice).
Hyoscyamus niger (Henbane).
Marrubium vulgare (Horehound).
Matricaria multiflora.
Melianthus comosus.
Leonotis leonurus (Wild Dagga).
Mentha longifolia (S.A. Mint).
„ pulegium (Pennyroyal).
Nepeta cataria (Catmint).
Peucedanum galbanum (Blister Bush).
Rhamnus Purshianus (Cascara sagrada).
Santolina chamaecyparissas.
Sassafras officinale.
Scilla maritima (Squills).
Stachys rugosa.
Sutherlandia frutescens (kankerbos).
Tanacetum vulgare (Tansy).
Valeriana officinalis (Valerian).
Vinca rosea.
Withamia somnifera.

PERFUMES AND AROMATICS.
Acacia Farnesiana (Cassie).
Adenandra fragrans.
Citrus histrix.
Cistus ladaniferus (labdanum).
Cymbopogon sp. (Akkewane).
Eucalyptus citriodora (lemon-scented gum).
Eucalyptus Smithii.
Iris pallida (Orris).
Jasminum tortuosum.
Lippia citriodora.
Lavandula vera (Kew) (Lavender).
„ „ (Grasse) (Lavender).
„ sp. (Director's House) (Lavender).
Mentha arvensis, var. piperascens (Japanese Mint).
Mentha sp. (var. 2) (Japanese Mint).
Mentha piperita, 2 vars. (Peppermint).
Micromeria biflora.
Ocimum americanum.
Pelargonium "Attar of Roses."
„ (Beckett 3 varieties).
„ capitatum.
„ "Compton."
„ "Fairbridge."
„ "Glaum."
„ graveolens.
„ quercifolium.
„ radula.
„ "Rosat."
„ scabrum.
„ "Stanford."
„ tomentosum.
„ "Van Zyl."
Rosmarinus officinalis (Rosemary).
Rosa damascena var. trigentipetala.
„ „ var. conditorum.
„ de L'Hay.
„ Kasanlik (Bulgarian Attar of Roses).
„ odorata.
„ Kasanlik rémontant.
Rose "Paula."
„ "Boule de Neige."
„ "Veilchen blau."
„ "Red Damask."

BUSH TEAS.
Aspalathus cederbergensis (Rooibos).
Aspalathus near corymbosa.
Cyclopia tenuifolia, Lehm. ("Vlei Tea").
Lebeckia Simsiana.
Leyssera gnaphaloides.
Paarl Tea.

FOOD PLANTS AND FLAVOURINGS.
Aberia caffra (Kei Apple).
Aralia cordata.
Bauhinia esculenta (Gemsbok Bean).
Bauhinia "Ofufe."
„ sp.
Camellia Thea (China Tea).
Capsicum "White Sweet Giant."
Carica cundamarcensis (Mountain Pawpaw).
Carissa grandiflora (Amatungula).
Carya Pecan (Pecan Nut).
Cephalandra quinqueloba.
Citrus aurantium var. Bergamia (Bergamot).
Citrus sp. subvar. Limone di Catalogne.
Citrus "Pomelo."
Cochlearia officinalis (Horse Radish).
Colchicum autumnale (Saffron).
Coriandrum sativum (Coriander).
Cucumis metuliferus.
„ africanus var. Zeyheri.
Eugenia Mitchelii (Pitanga Cherry).
„ uniflora.
Feijoa Sellowiana.
Glycine hispida (Soya Bean).
Guizotia Schultzii.
Hovenia dulcis.
Ipomea batatas, 2 vars. (Sweet Potato).
Java Bean.
Kafir Orange.
Kumarah (Sweet Potato).
Macadamia ternifolia (Queensland Nut).
Mentha viridis (Spearmint).
Momordica morkona.
Ocimum canum.
„ basilicum (Sweet Basil).
Olive "Queen."
„ "Picolon."
Passiflora quadrangularis (Grenadilla).
Phaseolus vulgaris (Haricot Bean).
Pistacia chinensis.
Pouteria suavis.
Pumpkin "Australian Ironback."
„ "Mrs. Newby's."
Punica Granatum, 2 vars. (Pomegranate).
Royena pallens.
Rubus "Japanese Wine Berry."
Sambucus niger (Elderberry).
Sechium edule (chocho).
Trichosanthes anguina (Snake gourd).
Wild Plum.
Zizyphus jujuba (Jujube).

FODDERS.
Acacia giraffae (Kameeldoorn).
Blanket Vine.
Ceratonia siliqua (Carob).
Chloris gayana.
Coix lachryma-Jobi (Job's Tears).
Coronilla glauca.
Crataegus sp. (Japanese Hawthorn).
Cymbopogon Dregeanum.
Cytisus proliferus var. palmensis.
„ pallidus.
Desmodium leiocarpum (Horse Marmalade).
Digitaria eriantha var. stolonifera (Woolly-finger grass).
Foeniculum vulgare (S. African fennel).
Foeniculum vulgare (Indian fennel).
Foeniculum capillare.
Gleditschia triacanthos (Honey Locust).
Ischaemum fasciculatum.
Lasiospermum radiatum.
Leucaena glauca.
Medicago arborea (Tree Lucerne).
Melilotus sp. (Huban Clover).
Napier Fodder.
Opuntia Monterey (Spineless Cactus).
Opuntia Morunda (Spineless Cactus).
Opuntia St. Rosa (Spineless Cactus).
Pennisetum unisetum (Kikuyu Grass).
Pentzia virgata (Karoobos).
„ incana.
„ globosa.
Pueraria Thunbergiana (Kudzu).
Phalaris bulbosa.
Portulacaria afra (Spekboom).
Prosopsis chilensis.
„ julifera (Mesquito).
„ Kirkii.
Rhynchosia sp.
Schoenoxiphium rufum.
Tarchonanthus minor.
Tricholaena rosea (red-top grass).
Trifolium subterraneum (subterranean clover).
Trigonella gladiata.
Vigna sp.

MISCELLANEOUS.
Acorus calamus (Sweet Flag).
Acacia arabica (gum arabic).
„ catechu.
Aleurites Fordii (Tung Oil).
Arundo donax (Spanish Reed).
Axonopus compressus (Carpet Grass).
Cynodon Bradleyi (Bradley Grass).
„ dactylon (Fine Quick).
„ transvaalensis.
„ sp.
Cyperus papyrus (Papyrus).
Eucalyptus macrorhyncha.
Eulalia villosa.
Grass sp. Bellville (Lawn Grass).
„ sp. Milnerton Beach (Lawn Grass).
Haematoxylon campechianum (logwood).
Humulus lupulus, 2 vars. (Hops).
Infigofera Anil (Indigo).
Isatis tinctoria (Wood).
Linum usitatissimum (flax).
Lippia repens.
Luffa acutangula (loofah).
„ sp.
Myrica cordifolia (berry wax).
Nicotiana (Havana Cigar Tobacco).
Phormium tenax (New Zealand Flax).
Populus sp. (Aspen).
Pseudosasa japonica (Bamboo).
Quercus suber (cork oak).
Rhus coriaria (Sumach).
„ succedanea.
Rubia tinctorum (madder).
Sesamum indicum (sesame).

II. The majority of the plants on the above list are at present being maintained in cultivation pending the time when fuller investigation shall become possible. Work on the experimental scale, has, however, been done on several subjects, and some of these will be mentioned, as follows:

(a) Lavender.
(b) Pelargonium.
(c) Peppermint.
(d) Buchu.
(e) Sumach.

In addition to these, preliminary work has been done on the following, and results of much interest are foreshadowed provided funds permit of further study:— Roses, Pyrethrum, Chamomile, Rosemary, Pennyroyal, Camphor, Fennel, Bush Teas, Berry Wax, etc.

(a) Lavender.

Oil of Lavender is one of the most important of the essential oils used in perfumery, a large demand existing which is relatively little affected by fashion. Attempts to produce oil of lavender in South Africa have hitherto been unsuccessful owing to the use of inferior varieties, and some disappointment has been felt in consequence. At Kirstenbosch, however, special efforts were made to obtain the best variety for oil production, and strains of *Lavendula vera* were imported from France and from England: these proved to be identical in appearance and in oil-yielding properties. Propagation has been carried on by cuttings, although a slow method, in order to avoid deterioration by crossing with the various other inferior varieties in common cultivation. Numerous samples of oil have been obtained by steam distillation, the yield being good. Some of these were submitted to the Imperial Institute for analysis, and through this medium to the trade. The reports have been highly satisfactory. The Imperial Institute states that "the oil had a very satisfactory odour" . . . . "the oil is of good quality and closely resembles the best French lavender oils" . . . . "regarding the yield of flowers and oil per acre, the results obtained in South Africa are very satisfactory in comparison with those obtained in England and France" . . . . "the aroma of the oil was excellent, resembling that of a good French oil though not so intense". A firm of distillers reported that "from the point of view of odour the sample was of excellent quality, resembling very closely the best French lavender oils". Another commercial firm stated that they "tried the sample out in various perfume blends with good results". A good size sample was submitted through the Imperial Institute to "an expert employed by the firm who are probably the largest lavender consumers in England. He is of the opinion that it is a very good oil for perfumery purposes and comparable with the best grades of French Mont Blanc lavender oil".

The Imperial Institute, in its most recent report, states that "in order to carry the enquiry further, it will be necessary to grow the plants on a sufficient scale to furnish a trial consignment of about 56 lbs. of the oil. If this is done the Imperial Institute will be glad to assist in disposing of the shipment". In order to obtain this quantity of oil it would be necessary to cultivate about three to four acres of the plant; and, using the present apparatus, at least 200 charges of the still would have to be distilled. This, at the rate of about six charges a day, would be a process extending over about six weeks. It is clear that this is impracticable under present conditions, and that in order to carry the very promising experiments a step further, as advocated by the Imperial Institute, additional land and labour and a larger distilling apparatus are essential.

(b) Pelargonium.

Oil of Pelargonium is extensively used in the perfumery, soap making and confectionery trades, to some extent taking the place of the much more expensive oil (or attar) of roses. The oil-yielding Pelargoniums are natives of the Cape Province, but their cultivation for oil-production has passed entirely to other countries. It may be expected that conditions in South Africa would be specially favourable for the cultivation of these plants, and experiments have been carried out at Kirstenbosch for several years to test this possibility.

A considerable number of species and varieties of Pelargoniums were collected from the wild state and from gardens, etc., in South Africa and Europe; these were grown in plantations at Kirstenbosch, and distillations were carried out. The results were disappointing as regards yield in every case except two, viz. (1) *Pelargonium Radula*, a wild species which, however, yielded an oil of inferior odour, and (ii) a variety named "Rosat" which was obtained by a correspondent in the South of France, where it is grown for oil production. This Pelargonium "Rosat" proved to give a satisfactory yield of oil on steam distillation, and the oil itself appeared to be of good quality as judged by its aroma. This variety was accordingly propagated by cuttings, and samples of oil were obtained sufficient for small-scale tests. These were submitted to the Imperial Institute, which reported that "the oil represents a normal geranium oil, similar to the commercial Algerian and Bourbon products, and supplies should be readily saleable in the United Kingdom."

The production of a larger quantity of Pelargonium oil is, however, impracticable owing to lack of adequate land and labour and of a sufficiently large distilling apparatus. In the absence of these facilities no fair investigation can be made as to the cost of production of the oil on a commercial scale, and its payability under South African conditions of cultivation and marketing.

(c) Peppermint.

The oil obtained from *Mentha piperita* (Peppermint) and some other varieties of Mentha is used in very large quantities in confectionery and medicine. In South Africa many thousands of pounds of the oil are imported annually. The experiments carried out at Kirstenbosch by correspondents of the Gardens show that it is possible to grow *Mentha piperita* very successfully in various localities and to obtain a good yield of oil therefrom. Experiments are also being initiated with the Japanese peppermint, which is grown on a very large scale in Japan and America and which is the chief source of supply for sweet-making.

The oil of peppermint obtained by distillation at Kirstenbosch of material from several sources, has been produced in good quantity, but up to the present has shown itself somewhat deficient in menthol. It is possible that the Japanese plant will be more suitable for South African conditions than the English: at the same time the latter has not been fully tried out under summer rainfall conditions, though an encouraging result was obtained at Tzaneen, Transvaal; and it is most desirable that a chain of experiments should be made in various localities in order to discover the most suitable district for the culture. The Tzaneen correspondent considered that the crop would certainly be payable.

In order to do this work, however, funds are required to cover expenses of cultivation, transport, etc., and a large distilling apparatus is necessary to handle the crop expeditiously. The Imperial Institute has expressed its interest in the matter, and its willingness to examine further samples of oil from this country. The work, in fact, has reached the stage at which further facilities are necessary, failing which it must remain in abeyance as far as practical results are concerned.

(d) Buchu.

Buchu leaves, derived from native South African species of Barosma, are exported in large quantities from this country, principally to the United States. The greater part of this crop is harvested from wild plants, under the auspices of the Forest Department, and for various reasons there has been considerable over-production in recent years, so that those farmers who have attempted the cultivation of the plant have received very low returns for their crops. Another evil which results more or less directly from the gathering of wild buchu is the prevalence of bush fires in the Cederberg area.

The experimental cultivation of Buchu was undertaken at Kirstenbosch in order to convert the trade into a regular farming proposition, to improve the quality and prevent adulteration, and to check the destructive methods employed in the Cederberg. The crop has been regularly harvested and exported, and it has been shown to be a very satisfactory one for the farmer. South Africa enjoys a virtual monopoly, and the main reason that farmers are unable to reap full benefit from this is the flooding of the market with the wild product. The price of the Kirstenbosch leaf has fluctuated from 9s. to 4d. per lb. in accordance with the supplies and demand. There is little doubt that the price could be stabilised at about 1s. to 2s. per lb. if suitable measures were taken, and this could be turned to the benefit of the farmers.

Thanks largely to the work at Kirstenbosch the methods of cultivation are now well understood, and the Gardens have acted as advisers to a large number of growers.

The production of oil of buchu is a matter for the future, and it is possible that given sufficient supplies of this oil it would gradually replace the cumbrous and expensive export of the dried leaf. Kirstenbosch is well placed for experiments of this kind, but a large distilling apparatus is required in order to obtain the oil in sufficient quantities for marketing tests.

(e) Sumach.

Attention has been devoted at Kirstenbosch to the possibilities of producing Sumach — the dried and ground leaf of *Rhus coriaria* — which is the most highly priced of all the ordinary tanning materials on account of its special value for treating fine leathers. A small plantation of the plant has been grown at Kirstenbosch, where it has thriven, and experiments have been conducted on methods of propagation, time and method of harvesting, methods of drying, grinding, etc. The resulting products have been examined and analysed by the Imperial Institute, the Cedara Agricultural College, at Leeds University and in the laboratories of the Forestal Land Timber and Railways Co., Ltd., at Harpenden. The reports received have enabled

mistakes to be corrected, and the most recent report from the Forestal Co. shows that the analysis and tanning properties of Kirstenbosch Sumach are closely parallel with those of the best ventilated Sicily Sumach warranted pure Palermo. The comments made by the firm are as follows: "We consider the analysis and the leather test of the South African product very encouraging. The tannin content is good, the colour is excellent and everything would seem to indicate that you have grown a product which would compare very favourably with the best Sicilian Sumach."

With regard to the payability of Sumach as a crop it is impossible to make any definite statement at present. The difficulties are (1) certain problems as to propagation have not yet been solved and require further experiment; (2) suitable land is required for larger scale cultures; (3) a small mill is wanted for grinding the dried leaf. These difficulties, however, can certainly be overcome provided funds are made available for the purpose.

(f) Other experimental work which may be alluded to has been done on the following among other subjects.

(i) Attar of Roses. After repeated attempts, we have at last succeeded in obtaining the true Roses used in Europe for Attar production. These have been established safely at Kirstenbosch and are being propagated as rapidly as possible. The first step has thus been taken towards the production of this highly valued essence in South Africa.

(ii) Pyrethrum. The demand for this substance, chiefly produced from *Chrysanthemum cinerariaefolium*, has increased enormously in recent years. Experiments have been conducted at Kirstenbosch which show that the plant grows and flowers luxuriantly, and there is no doubt that large scale cultivation would yield a marketable product. The question of payability cannot be solved in the absence of larger scale experiments than have been possible up to the present.

(iii) Interesting products have also been obtained on the experimental scale from the following plants:— Berry Wax, Pennyroyal, Rosemary, Lemon Verbena, Pittosporum, Fennel, Tansy, Wormwood, and Camphor. The work, however, cannot be carried further at present owing to the lack of funds and the necessary apparatus.

III. This brief summary of the results of the work done at Kirstenbosch over a series of years strongly warrants the provision of adequate funds and facilities for its continuance and extension. With the means available up to the present everything possible has been done, and results of great promise have been obtained. The time has come when the work should be carried out on a larger scale, and for this funds are necessary: farmers and private growers cannot be expected to involve themselves in expense, trouble and disturbance of their usual routine on the problematical prospects offered by small scale experiment.

The requirements are as follows:—

A. A competent assistant to take charge of cultures, harvesting, distillation, etc., and of costing and other records.
B. Suitable land.
C. Necessary labour and tools.
D. A portable distilling outfit capable of dealing with bulky charges of material.
E. A small mill of suitable design.
F. Funds for the above expenditure and for current expenses, and for the cost of experimental cultures in various parts of the Union.

The total cost of the work would not be heavy, and would appear to be completely justified by the promising results achieved so far: for it is clear that the potential value of the new cultures and industries to South Africa is very considerable.

Kirstenbosch,
November, 1933.

Summer Flowers at Kirstenbosch.

By J. W. MATHEWS.

THERE has been for some years a marked want of colour during the summer months throughout the Gardens. A want very much felt by the lover of purely garden effect or display. It must however be borne in mind that as a botanic garden the botanical species of little or no horticultural merit are equally valuable, even more so, from various points of view. For these will have to be found a place always, and as time goes on this class will become more and more pronounced in the make-up of the Gardens. The main object is to have a complete a collection of native plants as possible, even at the expense of display, although a decorative department will come into existence as soon as the means and facilities will allow.

This absence of colour has been accentuated by the wealth and variety of colours more readily obtained during spring and early summer from a wide diversity of plants, plants from the Western Province mainly, and therefore naturally suited to the conditions of the Gardens.

However, each year now increases the number of kinds available for decorative purposes. It is obvious that as the collections of plants from all parts of the Union increase there will be an abundance of suitable material available, not only for the summer months, but all months of the year.

The lack of knowledge of the plants themselves, as well as their requirements has been, and still is, a stumbling block to a great extent. Books on the subject are non-existent, and observation and experience alone can teach. Many plants are new to cultivation, and quite a number new to botanical science even.

Gradually chaos and inexperience will give place to a knowledge of when and how to grow the unknown, and whether they are of sufficient merit for display or garden decoration.

The geographical distribution of plants seems to be the readiest key to their adaptability for summer flowering. The annual succession of bloom is, or will be, secured somewhat in the following order. During winter, spring, and early summer, plants of the Western Province are dominant. During early summer plants from Namaqualand, closely followed by those from the South Coast of the Cape will be prominent. Then from along the coastal belt and Natal, with plants from the northern regions inland for the summer and autumn. These very distinct floras will certainly overlap each other in their flowering periods, and it is only when their behaviour under the conditions of the Gardens is known that a system of, or routine cultivation will be evolved to secure the desired results.

Our present knowledge of the source of suitable material quite naturally places the plants from summer rainfall areas as the most important, whether from the drier parts, or from the coastal areas of more constant rains. It is also evident that plants from ground relying on the rainfall for their moisture are definitely earlier in flowering than those from streamsides, swamps, and vleis inundated during the rainy season. This is so in all the floral regions of the Union. Take for example plants of the Western Province. All annuals, and most bulbs and dwarf perennial plants, are over or passing over, as well as most Proteaceae, Heaths, and shrubs generally. Noted exceptions in dry-land plants are the showy species of Leucospermum, all Aulax spp., *Mimetes lyrigera*, *Protea latifolia*, and *P. grandiceps*. These will provide outstanding colour well into the new year.

Just now, late November, however, the most colourful plants are *Watsonia tabularis*, *W. Comptonii*, *W. fulgens*, and *W. angusta* in its various forms; *Disa racemosa*, and *D. tripetaloides;* and *Lobelia campanulata*, all from stream-sides, etc., in various parts of the Western Province.

Then will follow various species of Lobelia, Selago, Dianthus, etc., not forgetting the brilliant *Rochea coccinea* for massed effect. These are odd late-flowering species giving a splash of colour mostly on dry ground, and during the heat of summer.

Much the same divergence in flowering is found among the plants from the different regions. Plants commencing to flower now, natives of the summer rainfall areas, are Crinums, Agapanthus, Galtonias, Kniphofias, various Watsonias, and the outstanding plants for massing for prolonged flowering. *Tulbaghia violacea*, *Gerbera Jamiesonii*, *Dimorphotheca spectabilis*, and the superb *Sutera grandiflora*, which can be relied on to flower freely right

into the winter, as also can *Sutera phlogiflora* and *S. stenophylla*, two delightful plants for more or less permanent edgings.

Other species of the above will extend the display for a month or two, and will be joined by the delightful *Watsonia Galpinii*, *Gloriosa superba*, *Nerine appendiculata*, (the "Pink Agapanthus" of Natal), *Haemanthus Katherinae*, *Richardia Elliottiana*, *R. albo-maculata*, *R. Pentlandii*, *R. Rehmanii*, *Gladiolus Saundersii*, *G. salmoneus*, and numerous other Gladiolus species, as choice bulbous flowering plants, which can be readily grown to flower early or late as may be required to keep up a succession.

The distinct colour and flowers of *Dissotis incana* will give an accent away from brilliant colours, and where its roots can obtain a liberal supply of water.

In late summer and autumn, *Tritonia Pottsii*, *Crocosmia aurea*, *Watsonia Pillansii*, and *Schizostylis coccinea*, will be found valuable in isolated beds, or masses. At the same times, *Plectranthus Ecklonis*, *P. Peglerae*, *Iboza riparia*, *Pycnostachys urticaefolius*, and the grand and graceful *P. remotifolius*, will provide attractive blues. *Clivia miniata*, when well treated during the summer, is quite colourful in winter in a shady nook, but of no use in the open.

All the above are outstanding in form, colour, and variety, and together form a unique collection of sufficient decorative value to warrant mass-planting in gardens of pretension. Only a few can be termed bedding-plants in the accepted sense, of which *Lobelia campanulata*, *Tulbaghia violacea*, *Dimorphotheca spectabilis*, *Gerbera Jamiesonii*, the three Suteras, and *Pycnostachys remotifolius* are invaluable as well as distinct for the purpose.

There are very few plants available for summer with the necessary dwarf habit, free and prolonged flowering, and good colours, required for bedding-out. The most promising, so far, are: *Diascia rigescens*, *D. Barberae*, *D. capsularis*, the dwarf forms of *Nemesia foetens*, and the Natal form of *Lobelia coronopifolia*, among dwarf perennials. Of annuals there is a decided dearth, *Papaver horrida*, and *Cleome spinosa*, are more suitable for grouping in shrubberies than for inclusion in colour schemes for bedding. The biennial *Ceratotheca triloba* is also best as such. There remains only *Arctotis grandis* and *Delphinium macrocentron*, which is permissible although not found within our boundaries. *Wahlenbergia cernua*, and the local *W. capensis*, are useful in a restful garden, but not in the gay. The local progenitor of the garden Lobelias, *L. erinus* is a better bedder than any of the others, and is naturally summer flowering.

The mention of Garden Lobelias suggests what a spectacular effect could be produced by the unrestricted use of the garden hybrids and strains which have been produced from our native plants. What an object lesson on the improvement of plants, and the extent to which our wild flowers have been used for the adornment of the gardens throughout the civilised world. Such would be interesting, but a collection of the parents of the Lobelias, Geraniums, Pelargoniums, Ivy-leaved Pelargoniums, Gerberas, Gladioli, Montbretias, Kniphofias, etc., etc., would be most intriguing.

Experience up to the present indicates that the Gardens will have to rely somewhat on the following order for purely garden effects, which must always be subservient to botanical interests. Had a choice to be made it would be nearer the aims of the Gardens to have one plant each of a hundred kinds than to have a hundred plants of one kind.

There is a wealth of unrivalled material available for display from June to the end of October among the Western Province plants of all classes. From October to December the Namaqualand annuals from Klaver and beyond will hold sway, and hence to June a selection of the most suitable from the aforementioned natives of the summer rainfall areas.

Some of the Namaqualand annuals are not entirely amenable to cultivation, but trials at various seasons, and selection will doubtless secure what is desired among the Tripteris, Venidiums, the annual *Arctotis flaccida*, and *A. venidioides*, Wahlenbergias, Felicias, Manuleas, Zaluzianskyas, and *Dimorphotheca pinnata*, and *D. polyptera*. One plant of *D. pinnata* will always remain a memory of the Doorn River bank, Namaqualand. It was the pale salmon buff coloured variety trailing down a smooth faced boulder for three feet, and two feet wide. A starred mass of delicate foliage and flowers. Something to emulate, but entirely elusive to the present.

Kirstenbosch,
November, 1933.

Book Reviews.

E. S. STEEDMAN, M.A.: *A Description of some Trees, Shrubs and Lianes of Southern Rhodesia.* Pub. by the author. Rhodesian Printing & Pub. Co. Ltd., 1933. pp. xix, and 191. 92 plates. 7/6.

The large and fascinating flora of the tropical portions of Africa has, up to the present, presented very considerable difficulties to the visitor or interested resident owing to the lack of available descriptions of plants. With the opening up of the region and the increasing possibilities of carrying on normal life in higher regions, the demand for some means of acquiring knowledge of the flora by others than the professional botanist is steadily increasing.

In this book, Miss Steedman has entered upon the task of providing a popular work by which the trees of Southern Rhodesia can be identified, and in so doing becomes a pioneer in this field.

Her book does not attempt to cover the whole flora; it is confined to trees and shrubs, and even of these a limited selection is made. In the book some 300 plants are described out of about 1000 recorded woody plants in the country. At a first glance this may seem a small selection, but, as the book deals with a limited portion of the country, the proportion described is not so small as the figures might suggest. The districts from which the trees described have been collected are along the main watershed of Southern Rhodesia and hence include those with the largest populations and those most visited by the tourist.

The plants described are arranged systematically according to the system of Engler, and are placed under their Latin names. Native names are given and also English or Afrikaans names where available. An index of the native names is appended which should prove of great assistance. The native does as a rule know the trees and accurately distinguishes different kinds. This is unfortunately not the case with English names where the same is frequently applied to more than one species and often to quite unrelated species. Examples selected at random are "Yellow wood" used for *Podocarpus* and for *Monotes*, and "Waterboom" for *Eugenia* and *Euclea*.

The descriptions have been made from living plants and are especially full in regard to floral characters. Along with the descriptions are notes on the distribution, uses, and wood characters. In the descriptions a rather more extended account of the habit and of leaf characters would have proved very helpful, as so often the tourist visits the country in winter when few specimens can be found in flower.

84 of the plants are illustrated by drawings of a shoot and enlargements of the flowers. These drawings, which will be a great assistance to the reader in his identifications, are on the whole satisfactory though not all equal in merit.

In addition to the descriptive part the book contains an introduction dealing with some features of the distribution and a section on classification with a synopsis of the orders.

In the preface the author states that the book is intended for teachers and others interested and not for the specialist. In a popular book of this kind and especially one which marks a pioneer effort in an untouched field, very serious difficulties have to be faced, not least in the decisions on arrangement and on what to include and what to omit. Whatever the author had decided on these points criticisms would be directed against the result. Many of these Miss Steedman meets and forestalls in the preface where she explains the origin and purpose of the book: she most certainly warrants great praise for thus making available for the help and guidance of others the results of many years of patient labour on her part. The study of the trees of the country is now practicable for all interested and this should stimulate interest and one hopes may pave the way for a more complete flora which would include also the herbaceous plants.

From the standpoint of the practical reader who approaches the flora of Rhodesia without previous knowledge some criticisms may be made. The absence of any form of key or synopsis of the genera or species often necessitates a large amount of reading and comparing of descriptions. Some indication of the time of flowering too would have been very helpful. A more serious criticism can be made on the question of the names used. In the preface the author says that criticism was raised against her earlier publications, which have been incorporated in this book, on the ground that the names used had not been checked with the original descriptions of the species. Miss Steedman overrules this on the ground that the original descriptions are widely scattered, and, in any case, are not suited to a work of this character. While this attitude can evoke sympathy, as the labour involved in checking nomenclature would be great and would necessitate journeys to Europe, it is nevertheless unfortunate especially in a pioneer work. The names here adopted are likely to be followed and in those cases where there is doubt the confusion may be made more difficult to dispel in the future.

The book is quite well printed and got up. The main text is commendably free from misprints though there are a number in the introduction. The book is neither too large nor too heavy to be conveniently carried in the field.

R. S. A.

Flora capensis. Vol. V. Sect. II. (Supplement). Edited by Sir Arthur Hill. London: Reeve. 1933.

Sir Arthur Hill is to be congratulated on seeing the completion of this account of the Cape Flora, the publication of which has extended over so many years under the auspices of his predecessors in office. An innovation has been introduced in the illustrations, which add considerably to the value of the work. This supplement is a small one, dealing solely with the Gymnosperms, of which 27 species are here recognised. The account of *Welwitschia*, written many years ago by the late Prof. Pearson, is excellent and accurate, but the citations have hardly been brought up to date and we think the author would have disagreed emphatically with the alteration made in its systematic position "*as distinct from* Gnetaceae (Gnetum *and* Ephedra), *with which it has probably little in common,*" Prof. Pearson's own work having proved very clearly the close connection between *Welwitschia* and *Gnetum*, and the wide gap existing between these two genera and *Ephedra*. The reviewer is not aware of any recently published work which would justify the statement cited. The omission of any reference to Prof. Pearson's "Gnetales" is regrettable.

Stapf's account of the Podocarps is a very timely revision of the very much confused nomenclature and synonymy of the Cape species, carried out with his usual thoroughness and accuracy. We do not think his treatment of the species of *Widdringtonia* is equally satisfactory. In the generic description the scales of the male strobilus are stated to bear two pollen sacs, and this condition is shown in two figures of *W. cupressoides*, while in the description of this and each of the other species four pollen sacs per scale are (correctly) stated to occur. The two figures cited are either of a very rare abnormality or not drawn from nature. The remaining figures, drawn by Mr. Ross-Craig, are excellent.

Stapf's grounds for the publication of a new species, *W. stipitata*, seem hardly adequate. His own account of the specimens on which it was based, obtained from a single tree in cultivation, suggests it to be merely a horticultural variety of *W. Whytei*. The characters used in the clavis to separate the species are hardly constant enough for this purpose; the number of mature seeds in a cone is decidedly variable and the reviewer has seen normal cones of *W. Whytei* with only 9 or 10 seeds and of a species, presumably *W. cupressoides*, from the Amatola Mountains with 10 to 12 seeds and all other characters on which Stapf's *W. dracomontana* is based. If the last-named species is valid (which is open to doubt) then its range extends to the Amatolas. If the Amatola specimens are *W. cupressoides* then so also are Dr. Stapf's Drakensberg specimens.

It seems unfortunate that Moore's name *Stangeria paradoxa*, by which the only species of that genus of Cycads is so well-known to botanists the world over, should have had to be discarded in favour of the unfamiliar *Stangeria eriopus*.

In the account of *Encephalartos*, a genus on which Dr. Rattray is a recognised authority, more use might have been made of the very fine collection of Cycads in the National Botanic Gardens and the specimens in the Bolus Herbarium, which were apparently not consulted. It is also to be regretted that more information was not obtained about *E. ḳosiensis* before publishing an incomplete description of this interesting new species. Apart from this the key and diagnoses of the species are well worked out, and there are very few botanists who could have carried out this difficult work so efficiently.

In matters of detail there is room for some difference of opinion as to specific limits; e.g. are not two distinct species confused under *E. Lehmannii*, one with lobed, the other with unlobed, pinnae? Is *E. transvenosus* really synonymous with *E. Altensteinii*? And are *E. lanatus* and *E. laevifolius* really identical? But there are few genera in which such differences of opinion do not arise.

This small supplement of 46 pages is published at 7/6 and will be a necessity to every botanical library in S. Africa as well as to the specialist in Cycads or Conifers.

W. T. S.

The Botanical Society of South Africa.

ANNUAL REPORT, 1932.

In presenting their Annual Report of the Proceedings of the Botanical Society of South Africa, the Council are glad to be able to state that, in spite of the world-wide financial stringency that exists, the great majority of the Members have been able to continue their support, but, as can be expected, a certain number of subscribers, including many who have for many years past regularly contributed to the Society's funds, have been compelled by financial considerations to resign. Others, again, have altered their form of membership from Ordinary to Associate. Consequently there has been a shortage of revenue as compared with last year and this has been further adversely affected by the loss of exchange on overseas and Rhodesian remittances. In spite of these setbacks, however, membership has increased slightly, and it is hoped that the added revenue from overseas subscriptions, now that the £ has been adjusted, will be reflected in our next Financial Report.

MEMBERSHIP.—The Membership of the Society stands at:—

Life Members	72
Family Members	79
Ordinary Members	746
Associate Members	446
	1,343

which is an increase of 3 as compared with the previous year.

FINANCE. — As will be seen by the Balance Sheet, the total investments amount to £1,140 14s. 8d. The yearly contribution to the National Botanic Gardens was £658 5s. 0d., a decrease of £124 17s. 3d. as compared with the previous year — which year, however, marked the peak of the Society's contributions.

MEETINGS OF COUNCIL. — Four Meetings of the Council, as laid down by the Constitution, were held during the year under review. At the Annual General Meeting held on 13th April, 1932, the following Office Bearers were elected:— *President*: The Rt. Hon. Sir James Rose-Innes, P.C., K.C.M.G.; *Vice-Presidents*: Sir Lionel Phillips, Bart.; Sir Drummond Chaplin, C.B.E., K.C.M.G.; and J. B. Taylor, Esq.; *Members of Council*: Lady Phillips; Mrs. L. Bolus; Mrs. C. W. Coulter; Mrs. Mary Sauer; Miss E. Struben; Miss F. M. White; W. A. Eaton, Esq.; H. C. Starke, Esq.; C. J. Sibbett, Esq.; Col. P. Ross Frames; Major G. B. van Zyl; Professor R. H. Compton; Dr. Bennie Hewat; W. Duncan Baxter, Esq.; H. Tevis, Esq.; W. de N. Lucas, Esq.; Dr. J. Lückhoff; F. E. Cartwright, Esq.

At the Council Meeting held on 21st June, 1932, Sir Lionel Phillips, Bart., was elected Chairman of Council, and Mr. F. E. Cartwright Hon. Secretary and Treasurer.

Two vacancies having occurred on the Council during the year, Professor Nel and Brigadier-General J. S. Wylie were duly elected to serve.

JOURNAL. — During the year the Eighteenth Volume of the Society's Journal was published under the Editorship of Professor R. H. Compton, Director of the National Botanic Gardens. The Journal continues to create great interest, and is urgently sought after by kindred Societies all over the world, and frequent demands are made for extra copies for record purposes.

ANNUAL GATHERING OF MEMBERS. — The Annual At Home of the Society took place at Kirstenbosch on Tuesday, 18th October, in ideal weather. The Meeting was attended by 260 Members and their friends. Tea was served on the lawn by the Lessee of the Gardens Tea House. Mr. Duncan Baxter, Chairman of the Board of Trustees, in the unavoidable absence of the President of the Society, Sir James Rose-Innes, spoke of the work of the Society, and Professor Compton reported on the progress of the Gardens. Members had an opportunity of seeing work in actual progress in the extension of the Succulent Garden. This was the first occasion on which the At Home had been held on a day other than Saturday, and the experiment was so successful that it will probably be repeated in future years.

SUCCULENT GARDEN. — A further sum of £200 from the Life Members Fund was voted by the Society for the extension of the rock-work, paths, drainage and water supply in the Succulent Garden at Kirstenbosch. As a result of this, it has been possible to complete the western end of the Garden and to link it with the new work on the old Nursery site and the foot of the horse-shoe path. Practically the whole of the construction of the Succulent Garden has been financed by the Life Members Fund. the total grants for this purpose being £800.

During 1932, the Gardens distributed to Members of the Botanical Society and to other Institutions, 505 lots of material, this comprising 3980 packets of Seeds, 4213 Cuttings, 1959 Bulbs, and 13192 Plants and Seedlings.

The total number of contributions of plant material to Kirstenbosch during the year was 3335 lots, this comprising 332 packets of Seeds, 3056 Cuttings, 14145 Bulbs and 8414 Plants.

The Bolus Herbarium examined 916 plants from the Gardens during the year, and identified 624 of them as known species, and 49 as new species.

The number of Visitors recorded as entering the gates at Kirstenbosch on Saturday afternoons, Sundays and Public Holidays during 1932 was 50742, as against 48647 in 1931, and 45896 in 1930.

OBITUARY.—The Council has much regret in reporting the loss by death of a number of Members of the Society, including Mr. Walter Greenacre, a Life Member of the Society, and such old Contributors as Mr. John Orr, Mr. Louis B. Smuts, Lt.-Col. S. R. Timson, Mr. K. C.

Bairnsfather, Mr. J. C. Gohl, Mr. Harold Jones, Dr. A. H. Petersen, and Mr. Herman H. Bolus.

THANKS.—The Council has again to express its indebtness and sincere thanks to Mr. R. L. McDonald for his assistance in auditing the Accounts of the Society; to Professor Compton for his very valuable aid in having acted as Editor of the Journal; to the South African Association for use of their Board Room for Meetings of the Council; and to the Press for having reported the affairs of the Society.

LIONEL PHILLIPS,
Chairman.

BALANCE SHEET AS AT 31st DECEMBER, 1932.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Life Members' Fund		455 0 0	South African Milling Co., Ltd.,		
Subscriptions paid in advance		38 8 0	Deposit on Call	450 0 0	
Sundry Creditors:—			Accrued Interest	9 2 9	
Specialty Press, Printing Journal	86 18 0				459 2 9
Others for Stationery, etc.	4 9 6		Union of South Africa, 5% Stock,		
		91 7 6	1929/39 at Cost	300 0 0	
National Botanic Gardens, surplus			Accrued Interest	4 7 1	
for 1932		658 5 0			304 7 1
			Cape of Good Hope Savings Bank,		
			plus Interest Accrued		377 4 10
			Sundry Debtors:—		
			For Advertisements in Journal,		
			Part XVIII.		26 10 0
			Cash at Bank		75 15 10
		£1,243 0 6			£1,243 0 6

REVENUE AND EXPENDITURE ACCOUNT FOR 12 MONTHS ENDED 31st DECEMBER, 1932.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
General Expenses		36 19 4	Subscriptions—		
Clerical Assistance		43 10 0	Family	141 15 0	
Bank Charges and Exchange		23 16 7	Ordinary	587 5 1	
Stationery and Printing		28 6 3	Associate	83 15 1	
Annual Gathering at Kirstenbosch		22 9 3			812 15 2
Journal, Part XVIII, 1932	73 17 8		Sale of Journals		1 2 2
Less Advertisements	26 10 0		Donations		2 16 0
	47 7 8		Interest		48 10 9
Add Due for Advertisement in 1929 Journal unpaid and written off	1 5 0				
		48 12 8			
Balance of Cost of Post Card Publications	8 10 0				
Less Royalties received on Sales	5 5 0				
		3 5 0			
Surplus for year 1932		658 5 0			
		£865 4 1			£865 4 1

Audited and found correct,
R. L. McDONALD,
Auditor.

Cape Town, 28th February, 1933.

(Signed) LIONEL PHILLIPS, *Chairman.*

(Signed) FRANK E. CARTWRIGHT, *Hon. Treasurer.*

List of Members of the Botanical Society.

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

The star (*) indicates members who are also subscribers to the Karoo Garden, Whitehill.

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary, P.O. Box 267, Cape Town.

Honorary Members:
Hill, Sir Arthur.
Pearson, Mrs. H. H. W.
Seward, Prof. A. C.

A.

Abbey, W.
ABBOTT, W. C.
Abernethy, Miss O.
Adamson, Mrs. D. A.
ADAMSON, PROF. R. S.
Ainslie, Miss F.
Ainsworth, Colonel J.
AKERMAN, CONRAD
Albrecht, C. W.
ALBU, SIR GEORGE, BART.
Alderson, Miss D.
Alexander, A.
Alexander, Miss E. I.
ALEXANDER, MRS. G.
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ALICE, H.R.H. PRINCESS, COUNTESS OF ATHLONE.
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Allison, Mrs. J.
Allister, R.
Alston, Mrs. L. R.
Anderson, Mrs. C. L.
Anderson, Mrs. T.
Anderson, Dr. C. T.
Anderson, E. B.
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Armstrong, Mrs. W. H.
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Arnot, Miss
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Auslender, Mrs. E. M.

B.

Babbs, A. T.
Babbs, Mrs. A. T.
Bacon, Lt.-Col. A. D.
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Backhouse, J. S.
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Bain, W. G.
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Barry, G.
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Basson, N. J.
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Bates, J. T.
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Beard, H. R.
Beard, Mrs. W. A. M.
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Beck, Lady Meiring
Beck, T. E.
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Behr, C.
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Bennet, Mrs. H.
Bennett, A.
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Bernard, Mrs. M. E.
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Bertish, H.
Bertram, Mrs. M. E.
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Blake, H. G.
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Booth, C. O.
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Bowles, W.
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Brown, H. R.
Brown, J. R.
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Burtt Davy, Mrs. A.
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Butters, J. T.
Byng, Viscountess.

C.

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CLARENDON, H. E. THE COUNTESS OF
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Clarke, H. C.
Clarke, J.
Clarke, Col. Stephenson R.
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*Compton, Prof. R. H.
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Coombs, Mrs. J. W.
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Cooper, Mrs. W. E.
Cooper, Mrs. W. N.
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Cornwall, Mrs. J. P.
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De Wet, H. C.
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Dockrall, Mrs. A. W.
Dockrall, T. A.
Dockrall, Miss.
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Du Cane, Gen. Sir J.
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Du Toit, R. J.
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Dyer, Lady Thiselton
Dykes, W.

E.

Eagland, H.
Earle, Miss K. M.
Eastman, A. E.
Eastman, Mrs. A. E.
Eastwood, Miss A.
EATON, W. A.
Eccles, J. H.
ECKSTEIN, F.
Eckstein, Lady.
Eckstein, Miss H.
Edgar, Prof. C. S.
Edwards, Miss G. E.
Edwards, Miss G.
Edwards, Mrs. H.
Eldred. H. W.
Elkin, Mrs. B.
Elliott, Mrs. H. H.
Ellis, Mrs. A. M.
Ellis, Mrs. M.
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Emrys-Evans, Mrs.
Engelenberg, Mrs. F. V.
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Evans, Capt. D.
Evans, Hugh
Everitt, W.
Evetts, Miss L. B.
Eyles, F.

F.

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Felbert, T.
Ferguson, Mrs. E. W.
Ferguson, H. C.
FFENNELL, R. W.
Finch, Miss B. A.
Finch, J. R.
Fincken, V. S. T.
Findlay, G. M.
Findlay, G. Stuart
Fisher, Miss M. L.
Fleischmann, Mrs. L.
Fletcher, Mrs. P.
Flugge-de Smidt, R. A. H.
Foote, Mrs. J.
Forbes-Buchan, Col. C.
Ford, Mrs. D. M.
Ford, Mrs. L. D.
Forest Education, Director of
Forest Department (6 conservancies).
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Fowler, D. S.
Fox, Mrs. F. R.
Fox, H. W.
Fraser, J. B.
Friedlander, Mrs. A.
Froembling, Dr. W.
Frudd, H. W. D.
Fuller, Dr. E. B.
Fuller, Mrs. E. B.
Fuller, E. R.

G.

Gabbett, Mrs. P.
Gajana, Mrs. F.
Galpin, E. E.
Galsworthy, Mrs. J.
Galvin & Sales, Ltd.
Gant, L.
Garabedian, Miss S.
Gardiner, Hon. Mr. Justice
Garland, Miss M.
GARLICK, MRS. D.
GARLICK, R. C.
Garnett, G. S. B.
Gavin, Major F. C.
Gemquand, Miss M. E.
Geyer, Dr. A. L.
Geyer, Mrs. A. L.
Gibson, Mrs. W. P.
Giffen, M. H.
Gill, Dr. L.
GILLETT, MRS. A. B.
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OBJECTS:

(*a*) To encourage the inhabitants of South Africa to take an active part in the progress and development of the National Botanic Gardens at Kirstenbosch, and the Karoo Garden at Whitehill, and to induce them to appreciate their responsibilities therein.

(*b*) To augment the Government grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch and Whitehill.

(*c*) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

(*d*) To enlighten and instruct the members on botanical subjects by means of rambles, meetings, lectures and conferences, and by the distribution of literature.

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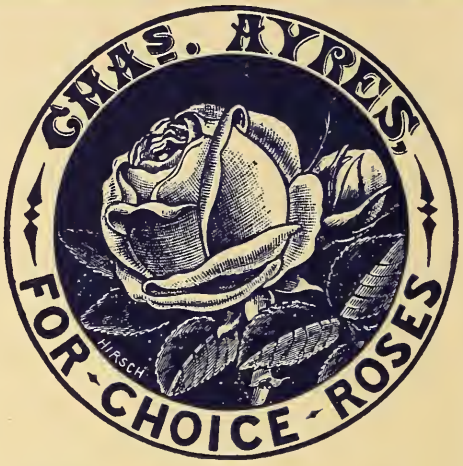

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Edited by R. H. COMPTON
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NATIONAL BOTANIC GARDENS

Part XX. 1934

KIRSTENBOSCH,
NEWLANDS, C.P.
SOUTH AFRICA.

Published under the authority of the Council of the Botanical Society.

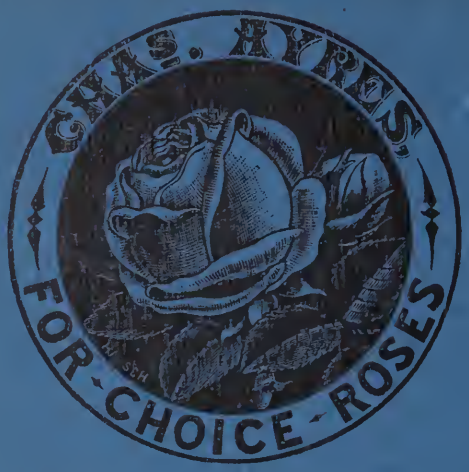

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PLATE I.—Ceropegias at Kirstenbosch. *Photos*: R. H. Compton.

The Journal of the Botanical Society of South Africa.

EDITED BY R. H. COMPTON.

PART XX 1934

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News and Notes.

THE Botanical Society of South Africa was founded in 1913 and has therefore "come of age" this year. The Council has felt that the best method of celebrating the event is to enlarge the membership. A campaign has been initiated under the organisation of Mr. F. W. Metelerkamp, and this has resulted in the addition of a considerable number of new names to the members' roll. We welcome these new members very cordially, not only for the additional financial assistance which they bring, but for the reason that they broaden the public basis upon which the National Botanic Gardens is developing into the status of one of the greatest botanical and horticultural institutions in the world.

* * * * * *

Year by year we have published in this Journal a table showing the way in which the Botanical Society has grown. In spite of depressions and other public vicissitudes, the membership has increased constantly, each year being a record. The following table shows that yet another record was established in 1933.

	Life.	Family.	Ordinary.	Associate.	Total.
1914	33	22	264	33	352
1916	49	26	264	45	384
1918	49	28	281	78	436
1920	54	45	384	237	720
1922	55	52	418	301	826
1924	62	57	455	313	887
1926	65	60	481	341	947
1928	66	54	581	345	1046
1930	71	76	718	414	1279
1932	72	79	746	446	1343
1933	73	81	761	456	1371

During 1934 the Membership has further increased by 210, or over fifteen per cent., largely owing to the "coming-of-age" campaign, and the numbers at the time of going to press are: Life, 77; Family, 93; Ordinary, 888; Associate, 523; total, 1,581.

* * * * * *

The National Botanic Gardens is undertaking the publication of a new scientific periodical entitled THE JOURNAL OF SOUTH AFRICAN BOTANY. This will appear quarterly, and the first number is to be published in January 1935. The annual volume will consist of about 200 pages of text and a number of plates. The subscription price to the public is 20s. per annum, or 6s. 6d. for single numbers, post free. Members and Associates of the Botanical Society are entitled to purchase the periodical at the reduced price of 15s. per volume or 5s. per number, post free, and it is hoped that many members will support the new venture.

* * * * * *

The Gardens are following the example of many of the other great botanic gardens of the world, by taking responsibility for a scientific publication. The scope of the new *Journal of South African Botany* is not, however, limited to work produced at Kirstenbosch: it is proposed to publish the results of research work done anywhere in South Africa or overseas, provided that it is upon South African botanical subjects or is of special interest in this country. The contents will not be limited to systematics, though this branch of botany will naturally be well represented. Support has been widely promised, and the new journal should prove of considerable value as a means of publication of botanical results which are at present scattered over a number of other periodicals or do not see the light at all. The Editor is Professor R. H. Compton, and the printers are the Cape Times Ltd.

* * * * * *

The first issue of the *Journal of South African Botany* contains an important monograph by the late Dr. N. E. Brown on the South African genus Freesia. This was one of the last pieces of work which came from Dr. Brown's pen before his death. It is an honour to the Journal, though a melancholy one, to be inaugurated by a characteristic work from the most prolific and at the same time the most critical and careful mind which has occupied itself with the South African flora.

* * * * * *

In Dr. Brown's monograph the genus Freesia consists of no less than nineteen distinct species (to say nothing of hybrids and garden varieties). The history of the genus is carefully analysed, both early and recent work being critically discussed. A feature of special interest is the history of the so-called "Freesia refracta alba" in origin and cultivation.

The new Journal contains the first series of "Plantae Novae Africanae", being descriptions of new species accompanied by plates in line and half-tone. Miss W. F. Barker, B.Sc., Botanical Assistant at Kirstenbosch, publishes two new species of Hessea, a genus closely related to Nerine: and Captain Salter and Professor Compton are each responsible for four new Ericas. The illustrations are all from drawings by Miss Barker.

In addition Professor R. S. Adamson contributes critical reviews on two important recent botanical works, namely Volume II of Dr. John Hutchinson's "Families of Flowering Plants", and the Collected Works of C. Raunkiaer now published in English.

* * * * * *

As mentioned in last year's issue of the JOURNAL, the Botanical Society agreed to recognise and support the Karoo Garden, Whitehill, and to appeal to members for subscriptions (additional to the membership subscriptions) of 10s. or more towards this object. The response has been very encouraging, and no less than 134 members have supported Whitehill by paying at least the additional subscription. This enables the Society to make a valuable contribution towards the cost of running what is undoubtedly the most remarkable collection of South African succulent plants in existence. Further assistance will be very gratefully appreciated. Readers may be reminded that Whitehill receives no grant from any public authority, and its funds are independent of those of Kirstenbosch.

* * * * * *

In the last issue of the JOURNAL, attention was called to the danger confronting the indigenous vegetation of the Kirstenbosch area, and in particular the Silver Tree woodland, as the result of the encroachment of aggressive exotics such as the pines, stinkbeans, blackwoods and hakeas: and an appeal was made for contributions towards a "Save the Silver Trees" fund.

The "Cape Times" newspaper took the matter up and opened a subscription list, headed by Mr. J. B. Taylor, in January. Many donations, large and small, were sent, and when the lists were closed in August, a total of £1,134 had been reached, of which £629 was earmarked for the Silver Tree fund, £118 for research work, and £387 for unspecified purposes. A list of the subscribers is given on a later page, and sincere and hearty thanks are rendered to them for their generous response to the appeal.

The subscription list includes an amount of £188, derived from the proceeds of a performance of "Midsummer Night's Dream" on the lawn at Kirstenbosch. This was produced by Mary Holder and Jack Bligh's dramatic school, with the assistance of Helen Webb's and Maud Lloyd's dancing schools and the Cape Town Orchestra. The organisation was carried out by the Cape Times, and the lighting was in the hands of the City Electrical Department. The performance, which was a great artistic success, was attended by Their Excellencies the Governor-General and Lady Clarendon, the High Commissioner and Lady Stanley, General and Mrs. Smuts, The Archbishop of Cape Town and Mrs. Phelps, and a large audience. Sincere thanks are due to all whose assistance contributed to a very unusual and delightful entertainment.

Another interesting occasion was the performance at the Paarl of Mrs. Rothmann's charming and imaginative play entitled "Wag Silwerbome", which had been published shortly before in *Die Huisgenoot*. This took place in the course of a concert arranged by Miss Rothmann of the Paarl Training College, and the proceeds were contributed to the Kirstenbosch Silver Tree fund. This co-operation by a town outside the Cape Peninsula was greatly appreciated.

* * * * * *

Thanks to the funds so obtained through the *Cape Times* it has been possible to undertake an extensive piece of clearance work among the exotic invaders of the Silver Tree area in the Klaasenbosch Valley. Regeneration of Silver Trees from seedlings is taking place very satisfactorily, and there is every prospect that if the work can be followed up during the next few years, the Silver Tree forest will be restored in a close approach to its pristine glory.

* * * * * *

An investigation has been made by Miss E. E. Esterhuysen, holder during 1934 of the Edward Muspratt Solly Scholarship at Kirstenbosch, into the causes of the mysterious and sudden deaths which occur among Silver Trees of all ages. The principal cause seems to be the tunnelling of the larvae of a certain native beetle, which work around the outer growing tissues of the taproot and lower part of the stem of the plant. In the case of young Silver Trees, the work of one or two such larvae may be sufficient to "ring-bark" the tree and cause its death.

Miss Esterhuysen left the work in an incomplete condition on her appointment to a Government post, but the main

facts seem to be sufficiently clear. A very difficult problem on which light is badly required is the question of how to deal with this pest and so save the casualties among the Silver Trees. Fortunately at present, regeneration of young trees greatly exceeds the losses by disease, but there is no knowing whether the pest may not become a more serious menace if no effective means of combating it can be found.

* * * * * *

At the beginning of the year there appeared to be a danger that certain of the activities of Kirstenbosch might be the subject of Government restriction, particularly the work on economic plants (which was summarised in an article in last year's JOURNAL): it being suggested in certain quarters that such work was not the function of botanic gardens in general, nor of Kirstenbosch in particular. The opinion of Sir Arthur Hill, Director of the Royal Botanic Gardens, Kew, was therefore sought. Sir Arthur wrote the memorandum which is printed, by his kind permission, on an ensuing page. In his covering letter, moreover, he expressed himself as follows: "A Botanic Garden *must be a centre of research*, not only taxonomic, but also in the many branches of horticultural science.

"This now covers a wide field, and where economic plants are concerned, involves the discovery of the *proper varieties which yield in maximum quantity* the desired product and *careful analysis* of the product itself. Then there comes the propagation and dissemination of the plant to the proper districts where it may be grown on a commercial scale to success.

"This demands skilled horticultural knowledge and a knowledge of conditions, soils, temperatures, etc., as well as a knowledge of the needs of the market and so on.

"Then the head of such a garden should always be on the lookout for plants *from other countries* valuable for economic purposes which it may be desirable to introduce for commercial purposes, and this I know you are constantly engaged upon.

"My great desire, especially since I have had the advantage of seeing Kirstenbosch and something of the work you are doing, is to see that provision is made for the enlargement of your useful activities.

"I regard, therefore, any suggestion of the curtailment of your work as a retrograde step verging on a national disaster."

* * * * * *

The Department of the Interior recently appointed a small committee of botanists to investigate certain matters connected with the National Botanic Gardens. This investigation was welcomed by the Trustees of the Gardens, who gave the Committee all information and facilities. It is not possible at present to publish the report of the Committee, but it may be said that it cordially endorses the aims and principles upon which the Gardens have been proceeding, regards with satisfaction the results that have been achieved, and recommends to the Government the provision of increased financial assistance.

The decision of the Government upon the last matter is awaited with interest.

* * * * * *

The extent to which Kirstenbosch is assisting in introducing to cultivation the indigenous plants of South Africa can be gauged, in respect of one section, the annuals, by an article written by Mr. A. P. Balfour (of Messrs. Sutton & Sons) in the Journal of the Royal Horticultural Society for July 1934. In this article entitled "Some South African Annuals", there are described and illustrated species of Nemesia, Venidium, Dimorphotheca, Ursinia, Dorothianthus, Zaluzianskya, Heliophila, Gorteria, Arctotis, Felicia, Cotula, Sutera, Gazania, and Senecio, and some others are alluded to. All these well-known South African genera are now becoming familiar and appreciated in English gardens: *the introduction of practically all of them is due to Kirstenbosch.*

* * * * * *

A report having been received that the University of Cape Town was considering a proposal to remove the Bolus Herbarium from its site at Kirstenbosch to a new site at Groote Schuur, the Council of the Botanical Society addressed a respectful protest to the University against the removal, which it regarded as being prejudicial to the interests and work of the Gardens. It will be recalled that the Bolus Herbarium was established at Kirstenbosch, on a site granted by the Gardens for the purpose, ten years ago. During this period the Herbarium and the Gardens have worked in close co-operation, to the advantage of both institutions. The separation of Herbarium from Gardens by a distance of four miles would create a serious obstacle to this collaboration, and would cause trouble and loss to the Gardens in various ways, while at the same time it is difficult to see any compensating advantage which would accrue to the Herbarium or the University. The relatively trifling difficulties which are the immediate reason for the proposal to transfer can readily be removed; and it is sincerely to be hoped that, in the interests of both Gardens and Herbarium and their mutual botanical work, the pro-

posal will be dropped, and the Herbarium allowed to develop at Kirstenbosch, in close touch with a large part of its subject-matter.

* * * * * *

Miss Mia C. Karsten's name is well known to those interested in South African succulent plants as the former editor of the Dutch periodical " Succulenta ", the organ of the Nederlandsche Vereeniging van Vetplantenverzamelaars, and as part author and translator of the fine work " Mesembryanthema " (Brown, Tischer, and Karsten), reviewed in this JOURNAL, Part XVIII, 1932. Miss Karsten visited South Africa last year, and has kindly contributed an article, illustrated by her own photographs, on her impressions of Kirstenbosch (where she resided for a time at the Harold Pearson Memorial Hostel) and of Whitehill.

* * * * * *

Mr. G. W. Reynolds of Johannesburg is a most enthusiastic collector and student of the Aloes, and a valued and constant correspondent of the National Botanic Gardens. He has made many valuable additions to our knowledge of this most interesting genus through his energetic collaboration with the Gardens and the Bolus Herbarium. The collections of Aloes at Kirstenbosch and Whitehill have been enriched by his gifts of specimens, among which the most noteworthy has been two large plants of *Aloe polyphylla* from Basutoland. In this part of the JOURNAL Mr. Reynolds contributes an article describing his journey to the locality in which this magnificent Aloe grows, and the nature of its habitat. *Aloe polyphylla* has hitherto refused to settle down in cultivation, but Mr. Reynolds' article may point the way to success.

* * * * * *

Mr. J. W. Mathews, Curator of Kirstenbosch, has contributed a further article on some of the many striking and horticulturally valuable South African plants which are being introduced to cultivation by the National Botanic Gardens. (Earlier articles in the series will be found in this JOURNAL during the last ten years.) This year Mr. Mathews deals with the Erythrinas — the kaffir boom and its allies — a summer-rainfall genus which has proved very successful at Kirstenbosch, and whose scarlet flowers are among the most vivid in the flora. He also describes the Ochnas, *Burchellia capensis*, and a recent most valuable acquisition at Kirstenbosch, *Alberta magna* from Natal and the Transkei, for which one can prophesy a distinguished horticultural future.

In this JOURNAL, Part XVIII, 1932, an account was given of the way in which local Nature Reserves were being established in various parts of the Union. Now there is progress to report, several new centres having set aside areas for the purpose. At Ficksburg, in one of the most beautiful and floristically interesting parts of the Orange Free State, the energetic local Horticultural Society has been granted an attractive and picturesque piece of ground on a boulder-strewn slope backed by a handsome krantz, through the goodwill of the municipality. This has been fenced and is being conserved as a sanctuary and home for the plants of the district. There is a prospect of the area being enlarged.

* * * * * *

In the Cape Province, Nature Reserves and Wild Flower Gardens have recently been established or initiated at Ceres, Paarl and Hermanus. At Ceres the municipality has decided to reserve and fence an area of great beauty on the mountain slope, close to the town. At Hermanus the Council is fencing a portion of the prominent koppie behind the town and clearing out the exotics, and the Hermanus Horticultural Society is taking control of it as a reserve and wild flower garden, on similar lines to the very successful one at Caledon. At Paarl the greater part of the Paarl Mountain, including the famous Paarl Rocks, has been proclaimed a Nature Reserve, and active steps are being taken to protect the beautiful and distinctive indigenous flora from the depredations of fire, flower pickers and firewood gatherers.

* * * * * *

It is satisfactory to note that karoo succulents — which need protection as much as or more than any other class of native plants — are also receiving attention in the same way. A very interesting aritcle by Mr. E. R. Fuller was published recently in a leaflet of the South African Succulent Society on the newly-established Nature Reserve at Prieska. In a recent letter to the Editor (6.11.34), Mr. Fuller writes from Prieska as follows: —" Some eighteen months ago we formed a Protection Society here and the Municipality have assisted us in setting aside, and getting it proclaimed as a plant reserve, a koppie half a mile from the town and about ten to eleven morgen in extent. The Committee comprises the principals of High and Primary Schools, Mr. E. G. Bryant, myself, and Mr. J. H. Viljoen, the Magistrate. The intention is to gather species of most of our North-Western flora and gradually get them laid out and grown on the koppie. We are in-

teresting the schools on the need for protecting our plants. I have also addressed the Farmers' Associations on the subject and they are quite sympathetic. Very soon we hope to rope in everyone and so gradually put a stop to the marauders who come here and uproot any and everything."

* * * * * *

By the death of Dr. N. E. Brown, South African botany suffers an irreparable loss. He was appointed assistant in the Kew Herbarium in 1873, and from then until his retirement in 1914 he largely devoted his untiring energies and critical skill to South African plants. After retirement, and until his recent death at his home at Kew at the age of 86, he laboured unceasingly, and although a victim of ill-health, his critical facilities remained unimpaired. His contributions to botanical taxonomy were innumerable, and he touched no subject without elucidating it. His life was modest and retiring, and though a formidable controversialist he was no publicist. He is responsible for a very large share both of the Flora Capensis and the Flora of Tropical Africa, his most important contributions being the monographs of the Asclepiadaceae, the " minor genera " of the Ericaceae, and Euphorbia, all representing extremely formidable tasks. In more recent years he has been the pioneer of the disintegration of the unwieldy genus Mesembryanthemum into more convenient units, and he has made valuable contributions to the understanding of various genera of Iridaceae. The number of genera and species published under his authority is enormous. His annotations on herbarium sheets are always helpful and reliable. He was essentially a worker in detail and published little on the theory or philosophy of the science: it was the plain facts which interested him and the unravelling of the tangles of nomenclature in which plants are so often involved. In his own sphere, his uncanny instinct, critical acumen, and patient devotion to analytical detail, made him a master and an authority.

Sir Arthur Hill's Message to Kirstenbosch.

THE necessity and great importance of a Botanic Garden in the Union of South Africa has happily been recognised by the establishment of the National Botanic Gardens, Kirstenbosch, and it is now possible to study there properly the very rich endemic flora of South Africa which, from the phytogeographical point of view, is one of the most interesting in the world.

A remarkable collection of the endemic plants has now been assembled at Kirstenbosch, under most suitable conditions, and the whole display in the magnificent setting is one which should be regarded as the proudest possession of the Union of South Africa.

The Gardens afford both to botanists and to the general public an opportunity for study and for the acquisition of knowledge of the flora, which is unrivalled in the Union, and the sciences of Botany, Agriculture and Horticulture have been greatly aided by the work which it has been possible to carry out at Kirstenbosch, in spite of the very limited funds at the disposal of the Institution, and its very small scientific staff.

It is essential for all botanical research to have collections of living plants. This has been recognised for many centuries in all countries which have been the pioneers in civilisation, but now that the science of botany is so much more important than formerly, the value of the botanical garden as an adjunct to scientific research is regarded as essential. Important as is the herbarium for systematic research, many plants can only be satisfactorily studied in the living state, or by means of collections of living plants from which specimens can be collected and dried for examination as their various stages unfold during the course of the year. This is particularly true in a country such as the Cape Province, where there are so many Monocotyledons which are so very fugescent.

Any curtailment of the funds available for the maintenance and growth of Kirstenbosch would be viewed with deep concern, not only by botanists in Great Britain, but by botanists in Europe and the United States, and by horticulturists and plant-lovers all the world over. Such a curtailment would be an even more severe blow to the Union of South Africa, where possibly it may not be fully realised how great an asset it possesses in the Kirstenbosch Gardens.

Should the Gardens be handicapped for lack of financial support, they will quickly deteriorate and sink to the level of a mere pleasure park, so that the high esteem in which they are held by the scientific world would be entirely lost. Such a degradation is unthinkable, and I trust that funds commensurate with the importance of the Institution will be supplied without difficulty.

Not only can there be seen at Kirstenbosch collections of living plants gathered from all parts of the Union, which otherwise could be seen only after months of travel, but the situation is one of the most beautiful in the world, and I consider it the paramount duty of your Government, to the present and to succeeding generations, to maintain and preserve for all time this priceless heritage.

Kirstenbosch is fortunate in having the Bolus Herbarium closely associated with it and situated in its midst — the ideal arrangement both for the Gardens and the Herbarium.

The opportunity for carrying out scientific research work in connexion with economic plants is also one of which considerable advantage has been taken at Kirstenbosch, and in which valuable advances have been made. From what has already been accomplished, it is clear that much more might be done in this direction, did funds and staff permit.

Any suggestion that the future of Kirstenbosch as a botanical institution may be threatened, or its scientific work imperilled, would be regarded with horror by botanists all the world over, and I trust to hear that my fears are quite unfounded

ARTHUR W. HILL,
Director,
Royal Botanic Gardens, Kew.

March 26th, 1934.

More Noteworthy Plants at Kirstenbosch.

By J. W. MATHEWS.

FROM time to time appreciative notes of various types of shrubs from the Western and South-Western Districts have been published in the JOURNAL. Types, distinct, attractive, and of the highest horticultural merit, outstandingly so for where natural climatic conditions approximate their requirements.

The Proteas, Leucospermums, Leucadendrons, Serrurias, Brunias, etc., natives of the above districts, represent the greatest aggregation of species and the highest decorative value found in those genera, and are invaluable evergreen shrubs for winter-rainfall areas generally.

In the Journal, Part XVIII, 1932, notes on the three known species of Greyias were published. These are deciduous flowering shrubs from the east coast and upwards, and are subject to more or less rain during the summers, and dry winters.

The results of permanent planting-out each year brings something new, or fresh, into flower in the Gardens. During the last few years several species of Erythrinas have flowered, and give promise of becoming most brilliant and attractive trees or shrubs. They are alike in being deciduous, but each is distinct in the time and mode of flowering.

The genus is best known to gardens throughout the world by the Brazilian *E. crista-galli*. It has even turned up here as a " South African " species, and, although it is not native, it is certainly a valuable herbaceous summer-flowering shrub for the whole of the Union.

Erythrina

The genus Erythrina is most interesting in various ways. Nicholson's concise description is instructive — " A genus of about thirty species of trees and shrubs, principally natives of tropical regions in both the New World and the Old, and at the Cape. Flowers coral-red, large, in dense racemes, produced usually before the development of the large leaves (in a few species on the ends of the annual shoots); calyx split, spathaceous, bilabiate; petals very unequal; standard large; upper stamen free to the base, or sometimes connate with the others halfway up the filaments; anthers uniform. Pod linear, turgid, torulose. Leaves constantly trifoliate." We may add — leaves deciduous; shoots sometimes herbaceous; pods sometimes spiny, and plants and leaves always spiny.

Dr. E. P. Phillips' Genera of South African Plants says — " Species about seventy-three, in all tropical and sub-tropical regions, seven species in South Africa, extending from the Transvaal, Natal, Eastern Orange Free State and Basutoland, and through the Eastern Districts to Uitenhage."

Distribution of the species throughout the world is quite intriguing for they occur in Brazil, Columbia, Mexico, West Indies, Teneriffe, Madeira, Tropical Africa and down to the Cape, East Indies, Polynesian Islands, and South Sea Islands. Thus practically girdling the earth.

The flora of Tropical Africa contains eight species as occurring within its limits, of which *E. Humei* and *E. tomentosa* extend into the Union. It is curious that *E. caffra* seems to be confined to the Eastern Districts and Natal, and does not occur in Tropical Africa, so far as at present known.

Considering the genus is so widely distributed it is curious and interesting that the distribution of individual species is very limited, and nowhere does there appear to be any approach to aggregation of species, other than in Africa.

There are five species described in the Flora Capensis, including *E. latissima*, which is given as a synonym of *E. tomentosa* in Sims' " Forest Flora of Cape Colony," where four species are described.

These two have not yet flowered at Kirstenbosch, but differences are apparent in healthy plants from Uganda and similar ones from Natal. They are very distinct from the other species, with large and striking foliage, more or less hoary with tomentum. The flowers of *E. tomentosa* are said to be " not showy ", but it is well worth growing as a foliage plant in a prominent position on a rockery. It is said to make a small tree up to twenty feet, whereas *E. latissima* is " A scrubby tree, 10-12 feet high."

The other four species have now flowered at Kirstenbosch and are very distinct from each other. The vivid colours, handsome or massive foliage, and diverse growths, make them valuable in all gardens. They form striking contrasts to the many heath-like foliage plants of the Western Province.

E. Zeyheri is a herbaceous perennial with short thick annual shoots clothed with few but very large leaves, often

two feet long. They form a low dense mass on the ground, and the bright scarlet flowers are borne well above the foliage on peduncles in the axils of the top leaves. A striking plant as individual specimens on flattish recesses or ledges of the rockery. It flowers in November. The root-stock is large and succulent, and of considerable weight.

E. acanthocarpa has a similar root, but the branches are perennial. It makes a " free flowering deciduous shrub about three feet high." The flowers are produced in September in dense racemes on the old wood. Upwards of a hundred flowers, about two inches long, are borne on each raceme, and develop from the base upwards. The lower two-thirds of each flower is a brilliant scarlet, the remainder being a greenish-yellow with a rich crimson edge to the tip of the keel. The whole has a brownish tinge giving them a satiny sheen.

The mode of flowering debars the usual pruning or cutting back, and indicates that not more than thinning-out will be needed.

E. Humei is a shrub " up to ten feet ", with " half herbaceous twigs ". The numerous bright, even vivid, scarlet flowers are borne on peduncles up to a foot long, and from the axils of the upper leaves of the young, or current season's growths. Four or five racemes may be produced on the one growth, singly from the axils. It undoubtedly promises to be a most brilliant and decorative shrub, flowering in January.

The mode of flowering indicates that the last season's growths may be cut back to advantage, say about half-way, to increase the number and strength of the annual growths.

E. caffra is the well-known " Kaffir Boom ", of which fine examples as to growth and size of tree may be seen in various parts of the Peninsula. Unfortunately, the brilliant crimson flowers are only sparsely produced owing to the attacks of a borer which kills the tips of the strongest shoots where the racemes are borne most freely. Attains up to sixty feet in height, and has smooth grey-green bark. It makes a huge bole with thick succulent roots often exposed on the surface for some distance from the trunk. It has been recommended as a street tree, but the above character and the effects of the borer nullify any other advantages in the Peninsula. It is a gorgeous tree when in massed flowering during August and September. Only once have I seen its glory.

Propagation is readily effected by cuttings of the ripe growths in autumn, except *E. Zeyheri*, and possibly *E. acanthocarpa* whose behaviour from cuttings I have not experienced. The hard scarlet seeds of all germinate freely and quickly when sown during September or October, and kept moist.

They all do well on a rich loamy or red soil, sufficiently deep to provide good drainage. All being native of the summer-rainfall areas, some attention to watering the dwarf species is advisable, and in the case of *E. Humei*, probably essential to strong growth and free flowering.

Unfortunately the last species is also attacked by the borer, and it seems necessary to keep the plants coated with arsenate of lead from December onwards if the results of the borer's activities are to be avoided.

Burchellia

Burchellia capensis has flowered in the Gardens for some years, and is an effective evergreen flowering shrub. Although closely related to the Gardenias, its scarlet tubular flowers are very distinct from Gardenia blooms. They are borne in clusters at the tips of the shoots, and are very freely produced each season from August to December. The flowers are an inch long, clavately tubular, and up to ten in a cluster. The calyces are yellow and red, and add to the colour effect.

It is an erect-growing shrub up to twelve feet in height, and constantly makes strong growths from the base, gradually producing a thicket-like appearance. As an inhabitant of the forests of the Southern and Eastern Cape and Natal it requires shelter and shade, partial shade at least, for its well-being.

It requires a light rich loamy or alluvial soil, and a fair amount of water throughout the summer. It should propagate readily by cuttings, with shade and a moist atmosphere, until rooted. It is subject to soft scale, which can be kept under control by a free use of the hose after flowering, or by spraying with resin-wash.

A beautiful and long flowering shrub where conditions suit it, of which shade seems as important as any.

The variety, *B. parviflora*, is not yet represented in the Gardens. It has shorter flowers, and orange-coloured instead of scarlet. It seems desirable. Can you send it, or seeds?

Alberta

Alberta magna, another member of the Rubiaceae, has flowered this year for the first time, and is decidedly ornamental as well as interesting. A plant three feet high has developed the large terminal panicles of scarlet flowers in a sequence from August up to now, the end of November, and at the moment has the last inflorescence in bud only.

It is an evergreen tree, said to attain from twelve to thirty feet in height, with a stem twelve inches thick. The leaves are large, thick, and shining, up to six inches long and over two wide. The deep scarlet flowers are narrowly tubular, slightly swollen at the throat, and over an inch in length. The calyx limb of five segments has three of them short, and two which continue to grow up to an inch long, ribbed and veined, and narrowed at the base like a leaf, and being a shining deep crimson colour, are easily mistaken for flowers. These calyx lobes are persistent, and lengthen the period of colour for two or three months.

It occurs in the Pondoland coast forests, and Natal, and is the only representative of a Madagascar genus of three or four species. From this, and from its robust appearance, it should certainly respond to a rich deep soil and liberal treatment, as well as copious waterings throughout the summer. Singularly enough the plants under review have withstood somewhat dry conditions in the summer, and a poor clayey but loose soil.

Propagation as for Burchellia, and, of course, both from seed when procurable.

Ochna

Another genus of strikingly decorative and colourful shrubs or small trees is the Ochna. It is distributed in Tropical Asia and Tropical Africa, and comes into the Union, where one of the tropical species, *O. pulchra*, is found in the Transvaal, with two other species, as generally recognised, confined to the Union.

The best known species is *O. atropurpurea*, which has been long cultivated in Peninsula gardens. It is a dwarf shrub about five feet high with a spread of six feet at ground level. It is not entirely evergreen, although a good proportion of the leaves persist through the winter. The pendulous soft yellow flowers are produced freely on the year old portions of all the branches, usually singly, with occasional twos. Branches are mainly horizontal, and a delightful effect is gained when the branches are thinned out sufficiently to exhibit the tiers of flowers or fruits to view. The crimson pedicels of the fruits are up to an inch long, the calyx and receptacle increase in size to about an inch across, and are also a rich crimson in colour. The seeds are drupes, light green turning to grey-green, then greenish-purple to black. They are attached to and hang from the now swollen receptacle around its sides, at right angles to the centre in *O. Natalitia*, and somewhat divergent to it in *O. atropurpurea*. The drupes take about two months to ripen and fall, leaving the remainder to persist for a month or two longer. The plant has a long decorative and colourful period, from the flowers which fall quickly to complete loss of fruits being about six months, usually from August to February.

Under the name of *O. arborea* a plant has this season flowered remarkably freely, and fruited almost as freely. Doubts arose as to its correct name when looking up the distribution of the genus. Sims' Forest Flora says of *O. arborea* — "A small tree, 12-40 feet in height, usually having a small crown and a clean unbranched stem 6-12 inches in diam., ... It usually coppices well if felled low. Leaves oblong, entire or few-toothed, coriaceous, two to three inches long, half to one inch wide, usually obtuse."

The plant under review has not been pruned, and has quite naturally made a thicket of growths from the root, none of which have shown any tendency to form a trunk or stem. They branch freely from the ground level upwards, the branches being erect or ascending at an angle of forty-five degrees from the centre, or the horizontal. The outline of the whole plant is pyramidal from the ground level.

Leaves are definitely lanceolate with sharply serrated edges, somewhat longer and wider than those of *O. atropurpurea*, to which *O. Natalitia* is referred as a variety.

Unfortunately, detailed descriptions of fruits are wanting, and all the Bolus Herbarium specimens are of branches in the flowering stage, excepting one sheet of *O. Natalitia* which has a fruit about half developed, and agreeing with those of the present plant as far as it goes. Compared with *O. atropurpurea*, the drupes are larger, five or six fully developed with, as a rule, several incompletely developed, and the calyx segments are larger, concave, and adpressed or clasping the drupes. On *O. atropurpurea* the segments are somewhat concave with the lower half erect and the upper half incurving, giving an alert appearance to the fruit as compared with the draped appearance in *O. Natalitia*, which seems to be the correct name of this plant.

In any case, it is a handsome and desirable shrub, and equally worthy of cultivation as *O. atropurpurea*, although larger in all its parts, taller of growth, and distinct in outline.

The Ochnas require similar conditions to the Erythrinas, but perhaps will thrive under drier conditions of soil and atmosphere. Both should make delightful hedges in suitable localities, the one up to five or six feet, the other up to ten feet and more.

Kirstenbosch,
November, 1934.

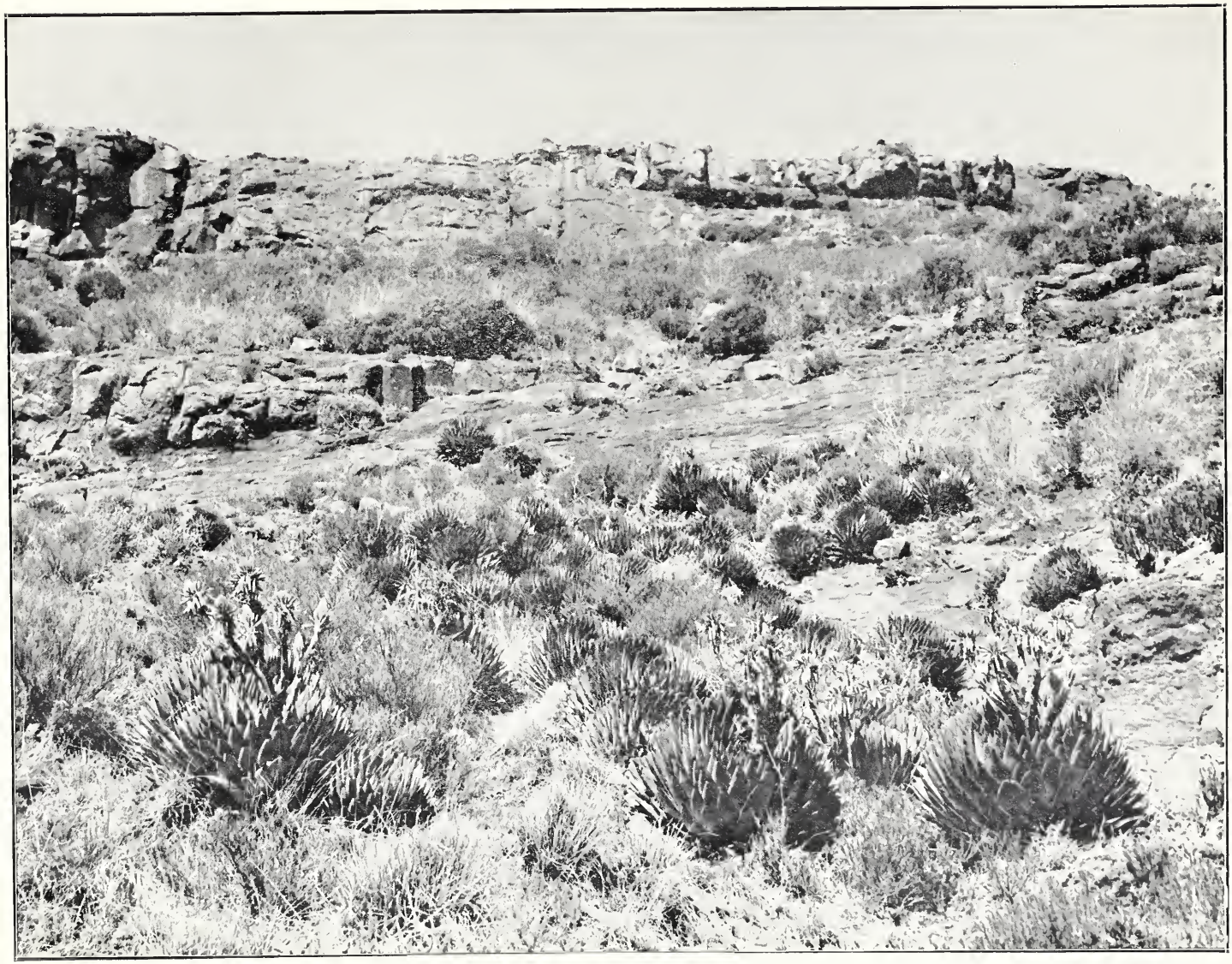


Photo: G. W. Reynolds.

PLATE II.—ALOE POLYPHYLLA: On a south-western slope of Furumela Mountain, Basutoland.

The Quest of Aloe polyphylla.

By G. W. Reynolds.

ONE of the rarest and least known of the genus, *Aloe polyphylla* was first collected in November, 1915, by Mr. F. H. Holland on the south-western slopes of Furumela Mountain, Maseru District, Basutoland. A year later the species was collected by Mr. W. Midgley, while in December, 1922, Mr. H. Ashton, now Asst. Commissioner in Maseru, collected it near Butha-Buthe in the north.

Apart from Dr. S. Schonland's notes in the Records of the Albany Museum, the only other record I have been able to trace is a brief reference in the article entitled " Our Aloes: Their History, Distribution, and Cultivation " by Dr. I. B. Pole Evans, which appeared in the Journal of the Botanical Society, Part V, 1919.

It would therefore appear that since 1922 this species has not been collected, and nothing added to our scanty knowledge of it. Dr. Schonland informed me that his plant had disappeared, while those sent to Kirstenbosch — I believe by Mr. Ashton — had also failed to survive. No plants in private cultivation could be traced until Mr. Ashton showed me two plants in his Maseru garden; they had not flowered in the five years they had been there, and sad to relate, the plant kindly given me by Mr. Ashton failed to become established in Johannesburg.

Then arose the earnest desire to run this unique species to earth, to see it in its wild state, and to find out more about it. Being keenly interested in the magnificent work being carried on in the National Botanic Gardens, I also wished to see a large specimen established there, and a complete range of material preserved in the Bolus Herbarium. And so began the quest.

On being assured by a traveller that he had noticed this Aloe growing at Cutting Camp in South Basutoland, I decided to investigate. The Orange River pont having been washed away — they usually are when needed most! — it was necessary to proceed to Quthing via Aliwal North and Herschel, thence 20 miles along the Orange River to Cutting Camp. After a stiff climb in sweltering sun, what should eventuate but *A. Broomii*; having always regarded *A. Broomii* as being second only to *A. castanea* for downright unattractiveness, my regard for it was certainly not increased on that occasion.

A few months elapsed before Basutoland could be visited again, and in the meantime one had to ascertain the locality of the Furumela Mountain, where the aloes were growing, and how to get there.

The road leads out of Maseru in an easterly direction, and after 20 miles of hard going and steep climbing, Roma Mission Station is reached. From there the " road " is simply shocking, and in one place actually leads over the bare rock of the mountain top. Eight miles east of Roma is Mr. John T. Thorn's Trading Station Nyakoesuba, delightfully situated on a plateau, at an altitude of about 7,000 ft. To the north-west is Machache Mountain (9,470 ft.), to the south Mt. Popa (7,550 ft.), while to the east lies Furumela Mountain (8,490 ft.). " Furumela " is Sesuto for " boggy ", so named since there are places nearby where, in the rainy season, cattle sink in and are submerged. Nyakoesuba is the nearest point one can possibly reach by car, thence it is a matter of bridle paths. Mr. Thorn very kindly provided a native guide and Basuto pony, but when that pony arrived, I had to shamefacedly admit that, thanks to our mechanical age, I had never ridden a horse in my life before. Safely mounted (but not for long, so far as I was concerned) we set off for Mofetesi's Village, 4 miles away; but not being accustomed to horse-riding, I appeared always to be coming down just at the moment the horse was coming up, with results that leave little to the imagination. My guide was visibly amused; I certainly was not. However, the village was safely reached, the ponies tethered, and then began the steep climb up the mountain side. About a mile from the village, below a krantz near the summit, at an altitude of about 7,800 ft., there were the aloes in all their pristine glory, a never-to-be-forgotten sight.

At this spot, which is snow-covered in winter, there are a few hundred aloes localised in an area of about two acres. They are growing in a heavy, somewhat clayey, black soil, on a steep, fairly bare, rocky slope, western aspect. Occasionally one sees solitary plants, but groups of a dozen or two are usual, a few yards separating each group. They do not spread by suckers, but occasionally a plant can be seen divided into two or three heads. When not flowering they somewhat resemble *A. Broomii* in habit. They are growing in raised, well-drained positions, almost

on their sides, and in a more markedly decumbent position that one usually sees in *A. striata*. The principal characteristic of this unique species is the remarkable, spirally twisted arrangement of the leaves, and one wonders why a more suitable name was not chosen. Would not *A. spiralifolia* have been perhaps more appropriate?

The rosettes are composed of 75-150 leaves, always in 5 rows of 15-30 leaves, which are spirally twisted in either a " clockwise " or " anti-clockwise " manner. Plants with either twist occur in the same group. Fully grown plants measure 36 inches across, and including inflorescence, are 24-30 inches high, and very heavy for their size, a plant only 15 inches across weighing 70 lbs. The leaf margins are armed with rather soft white teeth, but there is no fixed arrangement of these teeth. In some there are teeth in the lower half only, in others they occur in the upper half. Sometimes there are many more teeth on one margin than the other, while the spacing varies considerably. In the same leaf one sees teeth pointing slightly forward, while others are curved towards the base of the leaf. Another interesting point is the whitish keel which is never in the median line, but nearer either the left or right margin, in the upper third of back of leaf. Occasionally two keels are noticed. In young plants the keel is most noticeable, becoming less defined in older plants, until in the largest specimens often no trace of it can be seen. The inflorescence, which is branched very low down, bears up to twelve flower spikes, 4-7 being commonest. The perianth reaches a length of 55 mm. (the outer segments being free to the base), and is salmon-pink coloured, although here and there one sees an occasional yellow variety.

I took particular notice of a peculiarity which requires further investigation. Most of the flowers of *polyphylla* were clearly proterandrous, since the style remained exserted about 10 mm. after the anthers had shed their pollen, and the stamens had contracted within the perianth; but on closer investigation, a few flowers appeared to be proterogynous — the style was shorter and drier than the stamens, with the anthers shedding their pollen. The only other aloe in which I have noticed this is *A. transvaalensis* O. Kuntze, growing on the farm " Catfield ", 14 miles north of Johannesburg. Is this perhaps a case of heterostylism found in other Liliaceae, though I believe so far unknown in the genus Aloe?

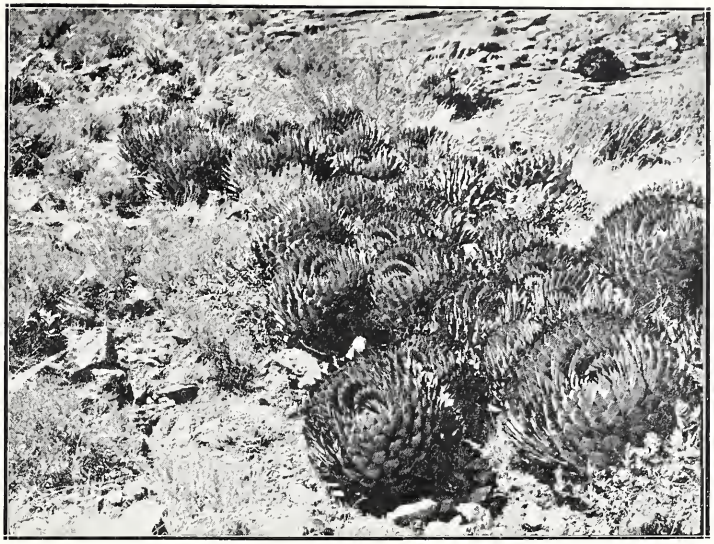
Notes and photographs having been taken, a full-sized inflorescence and a selection of leaf forms were cut for the Bolus Herbarium, and some plants as large as could be carried, selected for the National Botanic Gardens. Getting them down the mountain side undamaged was no easy matter. Native women from Mofetesi's Village set off for Nyakoesuba with the aloes perched precariously on their heads, while I must perforce use the pony. With the inflorescence and bundle of leaves under one arm, we set off, but it was not long before I lost a stirrup, at which moment the pony must needs decide to quicken its pace. In that predicament I was reminded rather forcibly of the lad whose rendering of " *Hic mihi non placuit* " was " This is no place for me! " However, the station was safely reached with the material undamaged, while a short time later the aloes were brought in, motored to Maseru, whence a fine large specimen was railed to Kirstenbosch.

It was only a fortnight later when examining photographs, I noticed for the first time that the leaves were spirally arranged in a " clockwise " and also an " anti-clockwise " manner. Fortunately, I had an opportunity of visiting that *polyphylla* patch again on 1st September, 1934, when another large plant, with leaves arranged in the opposite manner to the first, was collected and sent to Kirstenbosch. This very interesting pair is now established in the National Botanic Gardens, the registered number being 1744/34.

A. polyphylla Schonl. ex Pillans falls under Berger's section *Rhodacanthae*, and appears to be confined to the high mountains of West Basutoland. Recorded from Butha-Buthe in the north and Kubung in the south, Furumela Mountain in the centre seems to be its headquarters. There is another patch about two miles south of the locality mentioned, while they also occur on the eastern slopes of the same mountain near Makhaleng, which is about 10 miles east of Nyakoesuba. The Sesuto name for this aloe is Lekhala (Aloe) kharatsa (a coil, a spiral).

Growing in a locality of such difficult access, and large specimens being too heavy to move, plant-lovers can rejoice in the knowledge that there need be little fear of this remarkable and unique aloe ever being eradicated.

Johannesburg,
20th October, 1934.



a.—Group with clockwise and anti-clockwise arrangement of leaves.

b.—A fully grown specimen 36 ins. across.

c.—En route to Kirstenbosch — carried from the spot marked.

PLATE III.—ALOE POLYPHYLLA.

Photos: G. W. Reynolds.

Impressions from a Dutch Botanist.

By Miss MIA C. KARSTEN.

AS a member of the Dutch students' party that was touring the Union of South Africa in the winter of 1933, I first became acquainted with the National Botanic Gardens, when we stayed at Cape Town in the last week of July. At that time my visit to Kirstenbosch was a rather short one, only one morning could be given to me "to do" the Gardens. In September, however, after we had finished our wonderful tour through the Union, I planned to stay behind in South Africa and see Kirstenbosch and the wonderful Cape flora in springtime. Arrangements were made and I was put up in the Harold Pearson Memorial Hostel for one month, September 22nd — October 25th, the day I sailed back to Holland aboard the old vessel "Rietfontein".

KIRSTENBOSCH.

People who visit Kirstenbosch for the first time will be greatly impressed by the marvellous beauty of the spot. Kirstenbosch occupies a large part of the eastward slopes of Table Mountain, and wherever you go in the Gardens, you hardly can lose sight of the peaks of Table Mountain, viz. the steep Castle Rock with its deep forest-clad gorges, the much higher Fernwood Buttress and Devil's Peak, whose lower slopes are covered with pines. The upper slopes showed big yellowish patches which greatly puzzled me. When climbing Table Mountain on a bright day in October I found that those were formed by flowering specimens of *Leucadendron* (*L. salignum*, R. Br.) It is a most fascinating mountain landscape, and Kirstenbosch forms part of it!

The Hostel, a gay-looking whitewashed building in Cape Dutch style, built in 1925, lies in a wood of fine old oak trees; quite near the house there is a sound of splashing water, which is caused by a swiftly-running woodland stream. On grassy spots nearby I noticed a lot of arum lilies (*Zantedeschia aethiopica*, Spreng.) — a very common weed at the Cape! — showing their pure white sheaths. And the so-called "keurtje" (*Podalyria calyptrata*, Willd.) was also to be seen here; it is a shrub belonging to the Leguminosae and when it is in full bloom it is quite showy. The flowers are of a pinkish-mauve colour.

Apart from the indigenous vegetation and the shrub vegetation of the Upper Kirstenbosch Nature Reserve, Kirstenbosch contains a great variety of plants, trees and shrubs from all parts of the Union.

One of the most interesting features of Kirstenbosch is the Protea garden. Only for the Proteaceae one should already visit the National Botanic Gardens! From the Proteas which were flowering in September-October, the "Woolly-bearded Protea", *P. barbigera*, Meissn. ought to be mentioned first. The flower-heads are bigger than a man's fist and make a wonderful show of form and colour. Let me try to picture our "Woolly-beard". The involucre which is enveloping the woolly central part of the flower-head like an aureole, is of a rich shell-pink colour, the upper part of the bracts look as if they are trimmed with fur! White and purple-black are the colours shown by the hairy inner part of the flower which is frequently visited by large green beetles. I did not stay long enough at Kirstenbosch to see the enormous king Protea, *P. cynaroides*, L., which is flowering a couple of months later. Though this species produces the tallest flower-heads, it is not generally considered as the most beautiful of all species. *P. barbigera*, with its black heart, is certainly one of the most conspicuous ones. A famous representative of the Protea family is the Silver Tree, *Leucadendron argenteum*, R. Br., which is confined to the Cape Peninsula. On last year's garden party at Kirstenbosch, Prof. Compton called, in an address to the members of the Botanical Society of South Africa, the Silver Tree "the most beautiful tree in the world", and not without truth. It is a most graceful tree with a grey stem and branches bearing closely-packed alternate leaves which are covered with silky hairs of a silvery white colour which make the leaves glisten like silver in the sunshine! There is a beautiful wood of Silver Trees near the Director's House which stands on a high commanding position and from where you have a wonderful view of the Gardens, the wild indigenous vegetation at the foot of the Bolus Herbarium, and the Hottentot Hollands Berge in the far distance. It is much to be regretted that in several places the indigenous shrub vegetation of Table Mountain and more particularly the Silver Trees, are overgrown and smothered

by foreign importations like pines and *Hakeas* (an Australian Proteacea), Blackwood (*Acacia melanoxylon*), Grey Poplars and several others. The National Botanic Gardens are doing well by clearing those exotics and restoring the original vegetation. Proceeding to the other Proteaceae I wish to memorise the " Blushing Bride ", *Serruria florida*, R. Br., known only from the upper tributaries of the Berg River near Franschhoek, where it has become very rare. It is rather a small plant bearing clusters of very delicate pink flowers of extreme gracefulness. The *Leucospermums*, or " Pincushions ", made a wonderful display. Their flower-heads are very conspicuous because of their protruding styles which are curved in a very graceful way. Of the species I liked best *L. nutans*, R. Br. with rosy styles, and *L. conocarpum*, R. Br. with yellow styles are to be mentioned. *L. conocarpum* grows wild at Kirstenbosch, but the finest tree-like specimens I came across are to be found on the slopes of the mountains near Simonstown. Another member of the Protea family growing at Kirstenbosch is the Wild Almond, *Brabeium stellatifolium*, L., an arborescent shrub with hard leathery leaves which are regularly toothed at the margins. It did not flower at the time, but we know it produces trusses of small white flowers which are very fragrant. There are several specimens to be found at Kirstenbosch, and they are of historical interest, being a remainder of the hedge planted about 1660 by Governor Jan van Riebeek as a protection against the depredations of Hottentots and wild animals. In the old days of Van Riebeek lions were rather frequent on Table Mountain, and a mountain excursion must have been a rather thrilling experience at that time! Nowadays about the only animals you might come across when climbing Table Mountain are " dassies " and " muishonde ".

The Cycads, all species of the South African genera *Encephalartos* and *Stangeria*, are another interesting feature of the Gardens. They are of a most exotic appearance and very decorative.

The rockeries planted with succulents from the Karoo, the South-West, and other arid regions, form a part of the Gardens that one should not miss when visiting Kirstenbosch. *Aloes*, *Gasterias* and *Haworthias*, *Crassulas* and *Cotyledons*, *Euphorbias*, *Asclepiadaceae*, are shown here in great variety, they give some idea of the many forms and types represented in the South African succulent vegetation which cannot be compared with any other flora. Of the plants growing on the rockeries the *Cissus* species (*C. Juttae*, Dtr. et Gilg, and *C. Seitziana*, Gilg et Brandt) are most conspicuous because of their thick forked stems; being in their resting period and absolutely deprived of leaves, they looked very strange and ghostly! They belong to the Vitaceae, but when they are without leaves, one would hardly believe that they are really related to the Vines!

Very noteworthy was a specimen of *Euphorbia polygona*, Haw. affected by a very dwarf leafless Cape Mistletoe (*Viscum minimum*); the red berries of this parasite were distinctly visible between two ribs of the Euphorbia stem.

Most of the dwarf-like Mesembryeae, especially the mimicries, and " window plants ", are grown under glass, the Kirstenbosch climate being too moist for them. They are to be found in a greenhouse near the Office, together with many other succulents growing wild in extremely dry parts of the country and which would be affected by the climate which is so different from that of their habitat. With regard to the stemless Mesembryeae, I noticed among others a beautiful specimen of *Pleiospilos Nelii*, L. Bol., a stone-shaped plant with very thick dotted leaves, which are much more compact and rounded than those of the well-known *P. Bolusii*, N. E. Br.; *Lithops Comptonii*, L. Bol., a new species with a very transparent top (a fine " window plant "!); specimens of *Rimaria Heathii*, N. E. Br. with shiny white flowers arising from the narrow fissure between the whitish-green leaves; *Hoodia Dregei*, N. E. Br., a plant belonging to the Asclepiadaceae, whose many-angled stem was decorated at the upper part with several wide open flowers, being entirely covered with white hairs at their inner face.

In October the flowering *Heliophila azureiflora*, Schlecht. is a most striking feature of the Gardens. Its little flowers are as blue as the South African sky, and a whole field covered with it in flower is a most beautiful sight. It is an annual plant, belonging to the Cruciferae.

Spring is also the flowering season of many Compositae, which provided a dazzling display of colour; we noticed white, yellow and lilac *Dimorphothecas*, orange-coloured *Gazanias*, sky-blue *Felicias*.

Bulbous plants, for the greater part Iridaceae and Liliaceae, were flowering in great abundance and variety. The *Babianas*, *Lachenalias*, *Sparaxis*, grown in beds opposite the Office, were very showy, so were the *Watsonias* growing elsewhere in the Gardens. An extremely graceful bloomer is *Dierama pendula*, Baker, an Iridacea which produces long and slender stalks with drooping flowers of a very delicate mauve colour.

In the Heath garden many interesting *Ericas* were to be seen, but there were also very noteworthy species of *Erica* in full bloom in the uncultivated area; for instance,

on the slope of the mountain near the old trolley track (*E. viridipurpurea*, L., bright purple, and a white flowering variety of it; *E. Plukenetii*, L., characterised by long needles and rosy flowers; *E. coccinea*, Berg, with crimson flowers pointed upwards, and the purple *E. hirtiflora*, Curt.).

One of the main objects of the Gardens is the preservation of the native vegetation of the area under control. This means a fighting against the pines and Hakeas and other exotics introduced by men for economical purposes, which are a constant threat to the marvellous indigenous plants.

In co-operation with the Botanical Society of South Africa, Kirstenbosch is promoting the protection of South African wild flowers, which is a matter of the greatest importance.

WHITEHILL.

One of the most interesting trips I have made during my last month in South Africa is, I think, my visit to the Karoo Garden at Whitehill, 198 miles from Cape, on the main railway line to the Transvaal.

One Sunday night at about 9 p.m. I left Cape Town Station and arrived at Whitehill in the Western Karoo at 7 o'clock the next morning. The Garden and the surrounding veld did not look much as seen from the train: some *Aloes* near the little station gave some idea of a garden, and for the rest a grey stony plain with a scanty vegetation of *Mesembryanthemum spinosum* L., *Pentzia* ("Skaapbosse"), *Chrysocoma*, etc., all shrubby plants.

On the south arises the Witteberg range, standing out very clearly against the sky. As a matter of fact, the light in the Karoo is very bright and clear, which makes excellent photographing.

The Karoo Garden contains a great number of succulents from the more arid districts of the country; they are cultivated here under natural conditions, the average rainfall in the Whitehill area being about 6 inches annually. Among the plants grown in this Garden, which comes under the same control as Kirstenbosch, the fine specimens of the "kokerboom", *Aloe dichotoma*, L. fil., and the "boterboom", *Cotyledon paniculata* L., were very conspicuous. Mimicries and "window plants" were fairly well represented, several of them being in full bloom. We noticed two new Rimarias, both of them showing some flowers: *R. Primosii*, L. Bol. with yellow, and *R. Comptonii*, L. Bol. with magenta blooms.

Not the least interesting part is the uncultivated area outside the fence, where I spent the morning "succulent-hunting" with the Superintendent of the Reserve, Mr. J. Archer.

A very interesting succulent growing wild in this area is the "koesnaartje", *Crassula columnaris*, L., the entire plant consisting of a nearly spherical body of the size of a walnut or even smaller, formed by several pairs of leaves closely pressed together. We found several specimens of it, even a clump consisting of over 20 growths! *C. columnaris* being usually found as a single plant, a specimen of it grown into a clump is a most extraordinary feature. I took a photograph of this remarkable specimen, which is reproduced with this article. Since this plant is generally known as a striking example of mimicry, I was rather surprised and more or less disappointed, as we had no difficulty whatever in finding it. The small spherical bodies are of a brownish colour and grey is the soil and the stones surrounding them. This difference in colour made them rather conspicuous, even on a little distance. *C. columnaris* always grows on open ground fully exposed to the sun, just like *C. Archeri*, Compton, a species closely allied to *C. pyramidalis*, L. We were so lucky to find some specimens in full bloom; the small white flowers are produced in great profusion at the top of the angular columns formed by the leaves which are closely applied together in a most regular way. *C. Archeri* is undoubtedly one of the finest Crassulas which have been discovered thus far, it is very showy when it is in full bloom. These were not the only *Crassulas* which are growing wild at Whitehill, far from that. There were a lot of other species to be noticed such as *C. perfossa*, Lam., *C. congesta*, N. E. Br. (the "shaving-brush flower"), *C. deltoidea*, L., *C. lycopodioides*, Lam., *C. rhomboidea*, N. E. Br., *C. nudicaulis*, L., *C. cultrata*, L., *C. pyramidalis*, L., *C. quadrangularis*, Schönl., *C. Loganiana*, Compton.

The genus *Cotyledon*, another Crassulacea, is also represented by some very interesting species. *C. trigyna*, Burch. with leaves which are conspicuously marked with red dots we found growing among grey lumps of stone. Two species of *Cotyledon* which are rather plentiful at Whitehill are *C. Wallichii*, Harv. with a thick stem and spiny stalks and *C. reticulata*, Thunb. whose stem is covered by a little net formed by last year's inflorescence stalks bearing the loose calyces.

A very noteworthy plant is also *Anacampseros papyracea*, E. Mey. The plant which belongs to the Portulacaceae, consists of short branchlets which are entirely covered with white scales. These branchlets lie nearly flat to the ground, and if seen from a little distance, they really look like excrements of birds! It also belongs to the in-

digenous vegetation of Whitehill, and though it is often mentioned as a mimicry plant, we had not to search for it a very long time.

As a plant of special interest, Mr. Archer showed me *Pectinaria asperifolia*, N. E. Br., which only occurs hidden at the base of a shrub. This plant is the only indigenous Asclepiadacea I have seen in the veld at Whitehill, but there are more of them.

Last but not least a few notes on the Mesembryeae which are to be found growing wild at Whitehill. Apart from the shrubby *Mesembryanthemum spinosum* L., which is rather common in this area, I noticed among others very fine specimens of *Cheiridopsis cigarettifera*, N. E. Br., a very queer-looking plant, because of the white papery sheaths which envelop the long and slender leaf pairs at their base. Also a very dwarf *Conophytum sp.* is to be found here, wedged in small crevices of the rock. Interesting species are also *Ruschia pygmaea* and *Mes. resurgens*, Kensit, the latter characterised by papillous leaves and a thick tuberous root.

When I left Whitehill for Matjesfontein at 5 p.m. in order to see Mr. Logan's collection of *Lithops*, I had got some good idea of the singularly rich succulent vegetation of this little part of the Western Karoo. And I sincerely hope South Africa will have more reserves of this kind within a measurable space of time.

Terborg, Holland.
November, 1934.

The Flora of Africa.

By R. H. COMPTON.

IN this African Continent we find ourselves living in the midst of vegetation distinct in many ways from that which we should find in Australia or South America, or from that in which our near ancestors were bred in Europe.

To most of us immigrants it still seems peculiar in some ways. The European landscape in which our forbears lived for generations and which artists and writers have put on canvas and paper for us, is familiar in a way in which the African landscape is not.

We South Africans came from another continent. We brought with us pines from Europe and America, gum-trees from Australia, garden plants, vegetables, fruits and cereals from all over the world. To that extent our surroundings are familiar. But whence, we ask ourselves, came the plants which were here before us — the characteristic African plants?

All through Africa we find plants that are specially African and occur in no other part of the world. But, at the same time, these plants are often clearly related in some way to plants in other countries.

Take the great Protea family, South Africa's national flowers, so characteristic a feature of the coastal belt of the Cape Province. Travel East for thousands of miles across the Indian Ocean and we find obvious relatives of the Proteas in Australia; travel West across the Atlantic and we find others in South America. How can we explain this? Or take the Ericas or Heaths. Hundreds of species of them are in the Cape Province, and, thousands of miles away, a few species in the Mediterranean region and colouring the hills purple in Britain, the connecting link being a thin sprinkling of them along the high mountains of Central Africa. If we go to India or Ceylon we see tree Euphorbias very similar to those on the koppies of the Eastern Cape or Transvaal. Our Stinkwood tree has large numbers of close relations in South America. The thorn-bushes which cover thousands of square miles of Africa are obviously similar in flowers to those recent arrivals from Australia, the wattles.

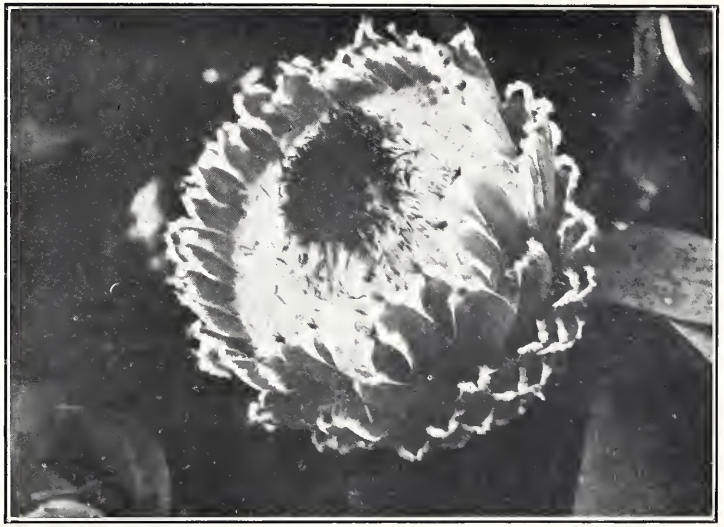
Everywhere one sees similarities between the African flora and the floras of other countries, east, west, north and even south (for the Antarctic Continent had its own flora when its climate was mild). At the same time one sees differences. What is the explanation?

To the botanist the resemblances between the African plants and those of other continents are explainable as the result of migration — the travelling of plants over the surface of the globe.

To some people this may be a difficult idea. They think that the chief difference between an animal and a plant is that an animal can move while a plant is stationary, rooted to the ground. Yet, on the whole, plants are more mobile than animals owing to the various means they have

a.—Castle Rock (Table Mountain) as seen from Kirstenbosch.

b.—*Crassula columnaris*, L. as growing wild in the veld at Whitehill.



c.—*Protea barbigera*, Meissn., Kirstenbosch.

PLATE IV.—Impressions from a Dutch Botanist.

Photos: M. C. Karsten.

of distributing their seeds far and wide by the wind, rivers, ocean currents and so on; also the fact that chance migrations of animals are checked by the need for two individuals, male and female, to propagate the race, whereas plants which are so often bisexual are frequently independent of sex limitations of this kind, in their migration.

If, therefore, we find the same, or related, plants in separate localities, close or distant, we usually conclude that migration must have taken place from one locality to the other or vice versa, or from some other locality to both.

Now migration is a very slow process as a rule, in a state of nature. It is true that some instances are known of the very rapid spread of a plant after it has entered a new country. Some of our noxious weeds in South Africa come to mind in which a species has been spread over hundreds of miles of country in a few years or a generation or two. But such plants are almost always assisted in their spread by human agency — by agriculture, veld burning, grazing, transport of forage and stock and so on.

Plants which are not capable of being helped in such ways as these travel very slowly. For instance, silver trees grow in the Cape Peninsula and 25 miles away near Somerset West. Let us suppose that the Cape Flats in between provided suitable ground for the growth of silver trees — which is not the case to-day whatever it may have been in past ages; let us also observe that a silver tree starts to produce seeds at about ten years old, and that the seeds can seldom be scattered more than ten yards from the parent tree. Then a little arithmetic will show that the migration of silver trees from the Peninsula to Somerset West (if that is the way it happened) must have taken something like 45,000 years to accomplish, and probably a good deal more.

The same arguments apply more or less to all the plants composing the flora.

Many species have a vastly greater range than the silver tree; others have an even smaller range. Our well-known red Erica extends from Cape Town right through Africa to the mountains of Abyssinia, say 4,000 miles; another Erica, Fair's Heath, is confined to an acre or two in the Glencairn Mountains.

Generally speaking, the longer a plant has had to migrate the further it will have reached; and conversely we come to the conclusion that our red Erica is a very old species, whereas Fair's Heath is probably a relatively young one which has not had time yet to spread very far.

When we consider such plants as the Protea family, present in all three continents of the Southern Hemisphere, it is clear that we must allow millions of years for them to accomplish their migrations, changing gradually as they travelled and producing all the great number of different forms which we call the Protea family to-day.

We have to remember, too, that the flowering plants of to-day are relatively modern. It is true that they seem to go back for some thirty million years at least, but this is only a fraction of the total history of the plant world on this globe. Before the flowering plants originated and spread over the earth's surface, other forms of plant life covered the ground; there was the age of the fern-like seed-plants, the age of the giant horsetails and club-mosses, the age of the primitive ferns, the age of simple algae living in the ocean before the emergence of life, animal and plant from the sea on to the dry land took place.

Some relics of these incredibly remote times persist with us to-day. Our well-known Cycads or Kafir bread trees are of enormous antiquity and deserve a special article to themselves. They occur in the Eastern Province and Cape Midlands, and extend thence through Natal, Zululand and the Transvaal to the Congo and the Gold Coast on the west and to Zanzibar and the Sudan on the east. Closely similar, though distinct, Cycads exist in other parts of the world.

Nothing could be more slow and deliberate than the Cycads — slow in growth, slow in coming to maturity, slow in distribution. How have they spread from continent to continent? The answer lies in the wonderful theory propounded by Wegener — the theory of floating continents. Far back in the world's history, though after the Cycads had appeared, the southern continents were clustered together in one vast, unbroken land mass. Then the Cycads and other prehistoric flora and fauna could wander freely from one continent to another without awkward jumps across oceans.

By and bye the continents split apart from one another and drifted off in their various directions, floating on the plastic interior of the globe: and with them they carried, like passengers on liners, their living cargo of plants and animals.

This theory of floating continents does not help us with the flowering plants, for they did not appear upon the earth until after the continents had started to drift apart from one another. How then can we explain the presence of similar plants in widely separated localities?

Take the Ericas as an example. It seems on the whole probable that they originated somewhere in Africa — perhaps in the mountains of Central Africa — and spread both north into Europe and south into the Cape Province, evolving new species as they went. The ones that got into

Europe were the tougher ones, more hardy to severe climates, and quite limited in numbers. The ones that came south were, so to speak, tourists attracted by the well-known South African climate, which, together with our soils, they found very much to their liking: they proceeded to settle here and to evolve in the Cape coastal belt the vast number of beautiful species which are so characteristic a part of its flora. There was no very great difficulty about this migration up and down Africa, for the continent has had an unbroken land surface for long ages, and the difficulties which a tropical climate might cause in Central Africa are got over by the presence of high mountains with a climate more to an Erica's liking.

How do we explain the African mahogany tree on our side of the Atlantic and its close relative, the American mahogany tree on the other? The same with our stinkwood and all its relations in South America, and with many other less familiar plants. It seems clear that some sort of land connection must formerly have existed between the west coast of Africa and the east coast of South America, along which such plants could travel.

So plants have come to Africa from all sides, North, East, South and West, and within Africa they migrate about wherever opportunity offers, so that, for instance, the forests of Table Mountain are the advance guard of a mass movement of forest trees from tropical Africa down through Natal and the Knysna region into the Cape Peninsula. But not only are plants migrating to-day as in the past; they are evolving new species all the time — new heaths, new proteas, new plants of every kind are being produced, slowly but surely, by Nature, the great horticulturist. And the combination of the two great processes, migration and evolution, acting and reacting through immeasurable ages, has resulted in the Flora of Africa as it exists today.

(*Broadcast*: *Cape Town*, *2nd October*, 1934.)

The Cape Times Kirstenbosch Fund.

The *Cape Times* newspaper in January 1934 opened a fund in support of Kirstenbosch work, the initial contributions being given by Mr. J. B. Taylor. Subscriptions were received under three headings, "Silver Tree Fund", "Research Fund", and "General Fund". The following are lists of the subscribers, as published in the *Cape Times* from time to time.

SILVER TREE FUND.

	£	s.	d.
R.A.	1	1	0
Mrs. M. S. Appleyard	1	0	0
W. Duncan Baxter	10	0	0
Lady Beck	10	0	0
Rev. T. J. Beechey	1	1	0
Miss H. E. Beard	1	1	0
A. H. C. (Ceres)	1	1	0
W.A.E.	10	0	0
S. Yorke Ford	1	1	0
Floreat Union	2	0	0
Hon. Lady Granet	1	0	0
R. Gwelo Goodman	10	0	0
Mrs. Armour Hall	20	0	0
W. E. Hortor	1	1	0
Sir Arthur Hill	10	0	0
F. E. K. Hare, I. M. Hare, and J. N. H. Logan		15	0
Miss A. Harsant	1	10	0
Mrs. A. T. Henshilwood	2	2	0
Miss M. W. Jones	3	3	0
Annie Key	1	1	0
Miss McIver	1	0	0
J.M.	1	0	0
Midsummer Night's Dream Performance	188	3	9
C. F. Man	1	1	0
G. Marais	1	1	0
C. J. D. Major	1	0	0
Mrs. A. H. Oxenham	10	0	0
G. Orpen	5	0	0
Orrfamtrust (Pty.) Ltd.	25	0	0
Overseas Club (per Miss Charles)	1	3	0
R. N. Parker	49	16	3
Paarl Concert (per Miss A. Rothmann)	9	7	8
Horace Pickstone	3	3	0
Mrs. A. Purcell	2	0	0
Mrs. J. Parker	1	0	0
Miss T. J. Pearce		10	6
Mrs Spencer Ray		10	0
Rustenburg Junior School	3	2	3
M. E. Risien	5	5	0
G. W. Reynolds	5	5	0
Major Dorrien Smith	5	0	0
Mrs. R. L. Scott	1	1	0
Miss J. Scott		10	0
Miss E. J. Solomon	12	10	0
C. J. Sibbett	5	5	0
E. R. Syfret	5	0	0
Mrs. J. F. Solly	10	0	0
Miss E. Steytler	2	2	0
J. B. Taylor	100	0	0
H. Tevis	50	0	0
W. J. Thorne	20	0	0
A. M. Thorpe	1	1	0
Miss J. van Staveren	1	1	0
Mrs. C. L. van der Byl	10	0	0
S. F. Waterson	1	1	0
Mrs. Woodrow	1	1	0
Total	£628	17	5

GENERAL FUND.

	£	s.	d.
Anonymous	100	0	0
M. L. Ashton	10	0	0
Mrs. A. Benning	10	0	0
Balgarthen, Kalk Bay	25	0	0
Rev. A. P. Bender	2	2	0
Ceres Horticultural Society	3	3	0
Ceres Divisional Council	3	3	0
Caledon Horticultural & Wild Flower Society	5	5	0
R. P. Davis	5	5	0
P. E. de Wet	1	1	6
W. K. Dose	1	1	0
G. Elliott & Son	1	1	0
Major V. S. T. Fincken		10	0
Mrs. G. Gibbs	1	1	0
Miss Gemquand	2	0	0
Lt.-Col. G. H. Grey	5	0	0
F. A. C. Guthrie	1	1	0
Mrs. A. J. Grant	5	0	0
Dr. C. L. Herman	5	0	0
Dr. Bennie Hewat	1	1	0
Miss N. G. Henshilwood	1	1	0
Miss L. Jones	5	5	0
Miss K. Kupfenberger		10	0
Miss J. L. Kielblock		10	0
Mr. & Mrs. L. B. Lewis	2	2	0
Mrs. M. Moldenhauer		10	0
Professor Moorrees	1	0	0
C. W. Newmark	1	1	0
W. A. Philip	100	0	0
M. Pevsner	10	10	0
Mr. & Mrs. W. H. Ramsbottom	2	2	0
Captain C. Struben	5	0	0
Hon. R. Stuttaford	20	0	0
C. C. Silberbauer	1	1	0
Miss E. Struben	10	0	0
A. W. Spilhaus	5	0	0
Hon. Mr. Justice Stratford	10	0	0
Mr. & Mrs. W. J. Spracklen	10	0	0
G. Stewart Findlay	2	2	0
Mr. & Mrs. H. M. Thomas	5	0	0
A.T.		10	0
The "Vagrants"	1	1	0
R. J. Verster	3	3	0
Lord Wynford	2	0	0
Total	£387	2	0

RESEARCH FUND.

	£	s.	d.
Miss E. J. Solomon	12	10	0
C. J. Sibbett	5	5	0
J. B. Taylor	100	0	0
Total	£117	15	0

The Botanical Society of South Africa.

ANNUAL REPORT, 1933.

THE Botanical Society is to be congratulated upon a period of modest progress, although its membership is small compared with the number of our citizens who love flowers.

Interest in the steady work at Kirstenbosch and Whitehill is nevertheless growing. Thanks to the scientific attainments of the Director, the enthusiasm of the Curators at both the gardens, and fidelity on the part of the staffs, the display of our native flora is increasing. Specimens of the rarer plants are grown in the localities best suited to their habits; and it is hoped gradually to establish varieties in danger of disappearance in permanently safe positions. The fame of the Gardens spreads with the greater extent and variety of the collections, and, as a natural result, an ever-increasing stream of visitors follows. Some of our most precious wild flowers are threatened with extinction owing to reckless and extravagant picking. Should not the sale of wild flowers be entirely prohibited? A still graver evil, viz.: veld fires, threatens the destruction of our land. Accidental conflagrations may be inevitable, but deliberate incendiarism (for a few blades of early grass, or other excuses) should be stopped. It is encouraging to note that the national conscience is becoming aroused and incensed in this connection. As a result of burning the vegetation covering, the soil becomes riddled with sloots and scars, resulting in wholesale erosion. The fertile loam is washed away (in place of absorbing the precious rains) and, more tragic still, the water rushes in waste to the sea. Thus are deserts formed! Are we, trustees of this well-favoured land, to sit supinely by while that catastrophe advances? Silent disapproval is of no avail. We must bestir ourselves to get effective measures applied. Opposition by interested persons is to be expected, but as grave diseases need skilful treatment, so this grave subject must be combated resolutely and courageously.

MEMBERSHIP.—It is gratifying to record that there has been a slight increase in Membership as displayed by the following figures.

Life Members	73
Family Members	81
Ordinary Members	761
Associate Members	456
	1371

which is an increase of 28 as compared with the previous year.

KAROO GARDEN, WHITEHILL. — The Botanical Society, at a Special General Meeting on 19th September, 1933, resolved to alter its Constitution to enable it " to give " general recognition and support to the Karoo Garden, " Whitehill, and to any other Garden that may be estab- " lished by the Trustees of the National Botanic Gardens, " to make grants to the Trustees in aid of such Gardens, " and to receive subscriptions as may be determined by the " Council with a view to obtaining funds for such grants- " in-aid."

Hitherto the Society has only been empowered to assist Kirstenbosch. The Council considered that any assistance given to Whitehill or any other Garden to be subsequently established should not in any way diminish the support given to Kirstenbosch. It was decided, therefore, that those members of the Society who wish to do so should be able to subscribe not less than ten shillings annually in addition to their usual subscription, and that the additional funds so obtained should be used for supporting the work at Whitehill, after deducting five per cent. towards the cost of administration of the Society.

The Trustees of the National Botanic Gardens have agreed to distribute ten packets of seeds from Whitehill annually on request to Members paying the additional subscription. There will thus become available to Members a large number of seeds of succulent plants, in which Whitehill specialises, and which it has not been possible to provide previously. Owing to the unusual value and rarity of these seeds, the Society decided that the new arrangements should only be open to Life, Family, and Ordinary Members.

The Seed List issued by the Trustees now consists of two sections — Kirstenbosch and Whitehill respectively.

The Whitehill section includes 222 items, many of which will be of great interest to collectors of this most fascinating group of plants — the South African succulents.

At the first meeting of Council after Annual Meeting Sir Lionel Phillips, Bart., was re-elected Chairman of Council, and Mr. F. E. Cartwright, Hon. Secretary and Treasurer.

JOURNAL.—During the year the Nineteenth Volume of the Society's Journal was published, under the editorship of Professor R. H. Compton, Director of the National Botanic Gardens. In this issue the revised Constitution of the Society was published, and it contained most interesting contributions, among others from Keith Cowlishaw on Experiments in Cross Fertilisation of Certain Species of Amaryllidaceae, and Notes on Deferred Germination, by J. W. Mathews. The Journal continues to arouse very great interest in botanical circles all over the world.

FINANCE.—As will be seen by the Balance Sheet, the total investments amount to £1,257 6s. 7d. The yearly contribution to the National Botanic Gardens was £808 6s. 5d., an increase of £150 1s. 5d. as compared with the previous year.

MEETINGS OF THE COUNCIL.—Four meetings of the Council as laid down by the Constitution were held during the year under review. At the Annual General Meeting held on 18th April, 1933, the following Office Bearers were elected:— *President*: The Rt. Hon. Sir James Rose-Innes, P.C., K.C.M.G.; *Vice-Presidents*: Sir Lionel Phillips, Bart.; Sir Drummond Chaplin, C.B.E., K.C.M.G.; and J. B. Taylor, Esq.; *As Members of Council*: Lady Phillips; Mrs. F. Bolus; Mrs. C. W. A. Coulter; Miss E. Struben; Miss F. M. White; W. A. Eaton, Esq.; H. C. Starke, Esq.; C. J. Sibbett, Esq.; Brigadier-General J. S. Wylie; Professor Nel; Mrs. H. E. White; P. Ross Frames, Esq.; Major G. B. van Zyl, M.P.; Professor R. H. Compton; Dr. Bennie Hewat; W. Duncan Baxter, Esq.; H. Tevis, Esq.; W. de N. Lucas, Esq.; Dr. J. Luckhoff; F. E. Cartwright, Esq.

ANNUAL GATHERING OF MEMBERS.—The Annual At-Home of the Society took place at Kirstenbosch on Wednesday, 4th October, and was attended by about 300 Members and their guests. Sir James Rose-Innes, President of the Society, welcomed the members, and spoke of the increasingly important work which was being carried out in the Gardens. The Director paid tribute to the valuable work carried out by the Curator, Mr. J. W. Mathews, and expressed appreciation of the loyalty of the Staff. Members had an opportunity of viewing the Succulent Garden which was nearing completion, the cost of which had been defrayed by Special Grant from the Botanical Society.

During 1933, the Gardens distributed to Members of the Botanical Society and other institutions, 538 lots of material comprising 5,050 packets of seeds, 10,485 cuttings, 3,366 bulbs, 15,263 plants and seedlings.

The total number of contributions of plant material to Kirstenbosch during the year was 2,603 lots of material comprising 295 packets of seeds, 1,856 cuttings, 12,065 bulbs, 7,956 plants and seedlings.

The number of visitors recorded as entering the gates was as follows: Saturday Afternoons, 10,172; Sundays, 36,285; Public Holidays, 10,506; being a total of 56,963, making an increase as against last year for these days of over 6,000. No records are kept on other days.

The Bolus Herbarium examined 913 specimens from Kirstenbosch during the year, of which 599 were identified as known species and 59 as new species.

OBITUARY.—The Council has much regret in reporting the loss by death of a number of Members of the Society, including Sir Drummond Chaplin, C.B.E., K.C.M.G., Vice-President of the Society, and Mr. J. M. Stephen.

THANKS.—The Council has again to express its indebtedness and sincere thanks to Mr. McDonald for his kind assistance in auditing the accounts of the Society; to Professor Compton for his very valuable aid in having acted as Editor of the Journal; to the South African Association for use of their Board Room for meetings of Council, and to the Press for their hearty co-operation in recording the proceedings of the Society.

LIONEL PHILLIPS,
Chairman.

BALANCE SHEET AS AT 31st DECEMBER, 1933.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Life Members' Fund		480 0 0	South African Milling Co., Ltd.,		
Subscriptions paid in advance	48 3 6		Deposit on Call	450 0 0	
Subscriptions to Karoo Garden,			Accrued Interest	9 19 2	
Whitehill	3 11 0				459 19 2
		51 14 6	Union of South Africa, 3¾% Stock,		
Sundry Creditors —			1948/58 at Cost	300 0 0	
Specialty Press, Printing Journal		88 5 2	Accrued Interest	2 16 3	
National Botanic Gardens, surplus					302 16 3
for 1933		808 6 5	Cape of Good Hope Savings Bank,		
			plus Interest Accrued		494 11 2
			Sundry Debtors —		
			For Advertisements in Journal,		
			Part XIX	26 10 0	
			Others	2 6 0	
					28 16 0
			Cash at Bank		142 3 6
		£1,428 6 1			£1,428 6 1

REVENUE AND EXPENDITURE ACCOUNT FOR 12 MONTHS ENDED 31st DECEMBER, 1933.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
General Expenses		41 7 8	Subscriptions —		
Clerical Assistance		48 0 0	Family	166 17 0	
Bank Charges and Exchange		6 1 0	Ordinary	674 5 8	
Stationery and Printing —			Associate	115 11 6	
Kirstenbosch	32 9 3				956 14 2
Whitehill	6 18 1		Sale of Journals		6 18 1
		39 7 4	Donations		2 6 0
Annual Gathering at Kirstenbosch		27 19 3	Interest		53 7 5
Journal, Part XIX, 1933	74 14 0				
Less Advertisements	26 10 0				
		48 4 0			
Surplus for year 1933		808 6 5			
		£1,019 5 8			£1,019 5 8

Audited and found correct,
R. L. McDONALD,
Auditor.

Cape Town, 28th February, 1934.

(Signed) LIONEL PHILLIPS, *Chairman.*
(Signed) FRANK E. CARTWRIGHT, *Hon. Treasurer.*

List of Members of the Botanical Society.

(LIFE MEMBERS: FAMILY MEMBERS: Ordinary Members: *Associates.*)

The star (*) indicates Members who are also subscribers to the Karoo Garden, Whitehill.

In case of any inaccuracy in the following list it is requested that notification should be made to the Hon. Secretary, P.O. Box 267, Cape Town.

Honorary Members:
Hill, Sir Arthur.
Pearson, Mrs. H. H. W.
Seward, Prof. A. C.

A.

Abbey, W.
ABBOTT, W. C.
Abernethy, Miss O.
Ackerman, Mrs. G.
Adamson, Mrs. D. A.
ADAMSON, PROF. R. S.
Aiken, Mrs. A.
Ainslie, Miss I.
Ainsworth, Colonel J.
AKERMAN, CONRAD
Albert Road School. Woodstock, Prineipal.
Albrecht, C. W.
ALBU, SIR GEORGE, BART.
Alderson, Miss D.
Aldridge, K. W.
Alexander, A.
Alexander, Miss E. I.
ALEXANDER, MRS. G.
Alexander, Mrs. J.
ALI, H.H. PRINCE MOHAMED
ALICE, H.R.H. PRINCESS, COUNTESS OF ATHLONE.
Allison, J.
Allison, Mrs. J.
Allister, R.
Alston, Mrs. L. R.
Anderson, Mrs. C. L.
Anderson, Colonel Sir Llewellyn.
Anderson, Mrs. T.
Anderson, Dr. C. T.
Anderson, E. B.
Andersson, E. J.
Andersson, Mrs. E. J.
Anthony, E. A.
Appleyard, Mrs.
Apsey, J. T.
Arbuthnot, Miss I.
Arehbell, Mrs. J. E.
Arkwright, Dr. J. A.
Armstrong, Major H. W.
Armstrong, Mrs. W. H.
ARMYTAGE-MOORE, C.
*Arnold, Dr. G.
Arnot, Miss
ASHTON, DR. M. L.
Askew, F.
Attwell, Mrs. C.
Augustus, I. S.
Auslender, Mrs. E. W.

B.

Babbs, A. T.
Babbs, Mrs. A. T.
Bacon, Lt.-Col. A. D.
Bacon, Mrs. A. D.
Backhouse, J. S.
Baillie, Mrs. B. M.
Bailey, Mrs. M. E.
*Bain, Mrs. A. G.
Bain, W. G.
Bain, Mrs. W. G.
Baker, Mrs. F. Watson
Balfour, A. P.
*Ballantine, Dr. A. J.
Banks, Mrs. A. J. C.
Barnett-Clarke, Mrs. H. P.
Barker, Miss W.
Barlow, W.
Barlow, Mrs. G.
BARNARD, PROF. T. T.
Barnes, Capt. E. C.
Barnes, S. R.
BARRETT, P. N.
Barry, G.
Bartlett, Miss G.
Basson, Miss M. M.
Basson, N. J.
Battenhausen, Mrs. J. W.
Bates, J. T.
BAXTER, W. DUNCAN
BAXTER, MRS. W. DUNCAN
Bayley, Miss M.
*Beard, Miss H.
Beard, H. R.
Beard, Mrs. W. A. M.
Beattie, Sir J. C.
Beattie, Lady
Beek, Lt.-Col. A. A.
Beek, Mrs. A.
Beck, Lady Meiring
Beck, T. E.
Bedford, H. J.
Beechey, Rev. T. J. J
BEECROFT, E. E.
Beecroft, W. I.
Behr, C.
Bell, A. B.
Bennet, H.
Bennet, Mrs. H.
Bennett, A.
BENNING, A. T. J.
Bergh, Miss J. C.
*Bernard, Mrs. M. E.
Berry, H. O. W.
Bertie, Hon. A. M.
Bertish, H.
Bertram, Mrs. M. E.
Beverley, Miss M.
Bevis, A. L.
Biccard, G. J.
Bingham, Mrs. H.
Biesenbaeh, Miss M.
Bishop, P. J. J.
Bisset, F.
*Bisset, W. M.
Blaekbeard, Miss G. I.
Blackburn, H. W.
Blake, Mrs. A. S.
*Blake, H. G.
Blakeney, J. M.
Blathwayt, Mrs. G.
*Blandy, Mrs. G.
BLEEK, MISS D. F.
BLOCH, N.
Blohm, Rev. W.
Blumenfeld, Miss M.
Boast, Miss D.
Bock, Miss S.
BODDAM-WHETHAM, MRS. R. E.
BODEN, E. O.
Bohling, Mrs. E.
Bolster, Major R. C.
Bolton, E. J.
*BOLUS, MRS. F.
Bomford, Mrs. T.
Booth, Mrs. A. S.
Booth, C. O.
Borcherds, Mrs. J. S.
*Borlose, Mrs. E. A.
Bosman, Mrs. I. D.
BOSS, J. N.
Botha, C. C.
BOTHA, MRS. F.
Bothner, Mrs. C.
BOURKE, M. E.
Bowen, W. M.
Bowen, Mrs. R. W.
Bowie, Miss M.
Bowles, W.
Bowley, Mrs. M. A.
Boyce Thompson South Western Arboretum.
Boyd, Mrs. M.
Bradlow, Mrs. A. R.
BRAKHAN, A.
Brand, A. M.
Brandmuller, E.
Briggs, Mrs. A. C. R.
Bright, Mrs. H. Hepburn
Brimble, L. A.
*BRINK, DR. V.
BRINK, V. L.
*Britten, Miss L. L.
Brock, Miss M. E.
Broderip, E. F.
Bromley, Mrs.
Broome, Dr. E. M.
Brown, Professor A.
Brown, Mrs. M. G.
Brown, H. R.
Brown, J. R.
Brownlee, Lt.-Col. J. Innes
Bruins-Lich, H.
Brydone, R. R.
Buchanan, Mrs. D. M.
Buchanan, G. O.
*Buckton, Mrs. F.
Buhr, H.
Bull, Rev. C. E. S.
Bullen, A. H.
Buller, A. C.
BULLEY, A. K.
*Burbury, R. W.
Burdett, W.
Burkitt, Mrs. M.
*Burleigh, R. F.
BURMEISTER, J. E.
Burnett-Millar, R.
Burns, Mrs. A. M.
Burtt-Davy, Dr. J.
Burtt-Davy, Mrs. J.
Burton, Mrs. H.
Buss, W. G.
Butcher, H. J.
BUTCHER, W.
Butler, W. B.
Buxton, Mrs. F. C.
Byng, Viscountess.

C.

Cactus and Succulent Society of Great Britain.
Calderwood, Mrs. J.
Callaghan, Mrs. B. G.
*Callenfels, J. E. J.
Calvino, Prof. Dr. M.
Campbell, Mrs. F. M.
Campbell, Miss K.
Campbell, Mrs. W.
CAPE HORTICULTURAL SOCIETY.
Cape Natural History Club
CAPE PENINSULA PUBLICITY ASSOCIATION.
Cape Town Training College
Carnegie, Mrs. M. E.
Carrington, J. G. E.
Carter, Miss B.
Carter & Co., Geo.
Cartwright, F. E.
Cartwright, Mrs. F. E.
Cartwright, Mrs. J. D.
Cartwright, J. Stewart
Cartwright, Mrs. J. Stewart
Casalis, Mrs. G. M.
CASE, MISS M. R.
Castle, F.
Cave, Miss E.
Centlivres, Mrs. F. v. d. S.
Ceres Horticultural Society.
Chalmers, I.
Chalmers, Mrs. J.
Chamberlain, Dr. C. J.
CHAMBERLAIN, MISS M.
Chamberlain, W. S.
Champness, Mrs.
Chandler, Miss C.
Chappell, Sir Ernest
Chase, N. C.
Chase, Mrs. V. E.
Cheetham, Miss C. A.
Chisholm, D. B.
Christian, H. B.
Chubb, Dr. E.
Churchill, Mrs. F. F.
Cillie, Dr. G.
Cilliers, Mrs. J. J.
City Tramways Co., Ltd.
Clare, Mrs. H. W.
*CLARENDON, H.E. THE EARL OF
CLARENDON, H. E. THE COUNTESS OF
Clark, W. E.
Clarke, Mrs. C. J.
Clarke, Miss E. V.
Clarke, Miss F. E.
Clarke, H. C.
Clarke, J.
*Clarke, Col. S. R.
Clarkson, Mrs. C. F.

Clarkson, Miss G. E.
Cleaver, Sir Frederick
Cleghorn, Mrs. B. H.
Cloete, Miss C.
CLOETE, MRS. HENRY
Cloete, Mrs. P. A. M.
Close, J. E. P.
CLOSE, ADV. R. W.
Clutterbuck, Mr.
Cochrane, C.
Cocker, H. R.
Coldrey, R. G.
Coldrey, R. J.
Collegiate School for Girls, Port Elizabeth
Coles, Rev. H. J.
COLTON, MRS. W.
Combe, C. H.
Compton, Dr. A. G. W.
*Compton, Prof. R. H.
Conrieri, P.
Convent of the Sacred Heart, Kingwilliamstown, Mother Prioress,
Conway, H. E.
Cook, Miss A. D.
Coombs, Mrs. A. C. M.
Coombs, Mrs. J. W.
Cooper, Mrs. M. B.
Cooper, Mrs. W. E.
Cooper, Mrs. W. N.
Copenhagen, Mrs. J. W.
Cornwall, Mrs. J. P.
CORY, R.
Couldrey, Mrs.
Coulter, Mrs. C. W. A.
Coulter, Mrs. G. H.
Couper, Mrs. M.
Courke, Miss M.
Courtis, E.
Couser, W. J.
Cowlishaw, K.
Cox, G.
CRADOCK, MAYOR OF
CRAIG, J. W.
Crampton, Rev. W. M.
Crawford, Mrs. J. D.
Creswell, Mrs. F. H. P.
Crider, F. J.
Crighton, Mrs. G. E.
Cripps, Mrs. G.
Crittall, R. B.
Cumming, Miss J. C. D.
Cunningham, C. M.
Curlewis, Mr. Justice J. S.
Currey, Hon. H. L.
CURREY, MISS M. H.
Currey, W. A.
Currin, Mrs. M.
Curtis, H.
Cuthbert, Mrs. W.

D.

Dahlem Botanical Museum
Dale, D.
Dale, Miss E.
Dale, Mrs. H. R.
Dale, Miss V.
Dallas, Mrs. I.
DALRYMPLE, SIR W.
Daneel, Dr. P. M.
Daniell, G. V.
Darke, Miss E. B.
Darter, E. L.
Darter, Dr. G. B. Silver
DARTER, MRS. W. S.
Davies, Mrs. E. G.
Davies, Mrs. H. P.
DAWES, LT.-COL. F. R.
Dawson, W. F.
DEACON, MRS. J.
De Beer, Mrs. A. A.
De Beer, Mrs. R. E.
De Jager, Miss I. G.
De Kock, C. G.
De Kock, K.
De Laet, Fr.
Delbridge, Miss
De Mole & Kisch
Dent, Mrs. C. H.
Denton, W.
DE PASS, A. A.
De Smidt, Miss M. A.
De Villiers, Mrs. B.
De Villiers, C. C.
De Villiers, Mrs. C. C.
De Villiers, Mrs. D. G.
De Villiers, D. L.
De Villiers, Mrs. E. X.
De Villiers, Mrs. J. E.
De Villiers, Mrs. J. S.
De Villiers, Mrs. L.
DE VILLIERS, MRS LOCHNER
*De Villiers, Hon. Mr. Justice M.
*De Villiers, Mrs. M.
De Villiers, Mrs. R.
De Villiers, S. B.
De Villiers, Mrs. T.
De Villiers, Miss W.
De Villiers St. School.
De Vries, H. J.
De Wet, H. C.
De Wet, P. J. S.
Diamond, Mrs. F. W.
Diep River School
Diggle, Major P. G. W.
Divine, Mrs. F.
Dobbertin, T.
Dockrall, A. W.
Dockrall, Mrs. A. W.
DOCKRALL, T. A.
Dockrall, Miss.
Dodd, B. H.
Dodd, Mrs. J.
Dommisse, Dr. F. H.
Donald, Miss E. M.
Donaldson, Mrs. A. G.
*Dorrien Smith, Major A. A.
DOSE, W. K.
Douglas, J.
DOUGLAS-HAMILTON, P. S.
Douslin, H. B.
Downes, Major H. M.
Dreyer, Miss V.
Drury, D. D.
Du Cane, Gen. Sir J.
Duff, J. A.
Dugdale, Mrs. J. G.
Dugmore,, C. M.
Dugmore, Miss H.
Dumsday, E. S.
Dumsday, Mrs. E. S.
Duncan, G. A.
Duncan, Mrs. P.
Duncan, T. H. M.
*DUNN, MRS. A. A.
Dunn, Mrs. D. I.
Dunn, Miss L. G.
Dunsdon, H.
Dunsdon, Miss M.
Du Plessis, Miss R.
Durban Corporation
DURBAN & COAST HORTICULTURAL SOCIETY
Durban Municipal Library.
DURBANVILLE MUNICIPALITY, MAYOR OF
Durham, J.
DUTHIE, MISS A. V.
Du Toit, Mrs. A. P. M.
Du Toit, J. C. P.
*DU TOIT, J. P. S.
*Du Toit, Dr. J. S.
Du Toit, Miss M. E.
Du Toit, R. J.
Dyason, Mrs. E. C.
Dyer, Lady Thiselton
Dykes, W.

E.

Eager, Mrs. D. B.
Earle, Miss K. M.
East London, Municipality of
Eastman, A. E.
Eastman, Mrs. A. E.
Eastwood, Miss A.
*EATON, W. A.
Eccles, J. H.
ECKSTEIN, F.
Eckstein, Lady
Eckstein, Miss H.
Edgar, Prof. C. S.
Edwards, Miss G. E.
Edwards, Miss G.
Eldred, H. W.
Elkin, Mrs. B.
Elliott, Mrs. H. H.
Elliott, Mrs. K. C.
Ellis, Mrs. A. M.
Ellis, Mrs. M.
Ellis, R.
Emrys-Evans, Mrs.
Engelenberg, Mrs. F. V.
Ensor, Mrs. B.
Esterhuysen, Miss E.
Evans, Capt. D.
Evans, Hugh
Everitt, W.
Evetts, Miss L. B.
Eyles, F.

F.

Fairbridge, Miss B.
Falmouth, Viscountess
Farmer, Miss
Favell, R. V.
*Featherstone, Mrs. H. C.
Felbert, T.
Fell, H.
Ferguson, Mrs. E. W.
Ferguson, H. C.
FFENNELL, R. W.
Finch, Miss B. A.
Finch, J. R.
Fincken, V. S. T.
Findlay, G. M.
Findlay, G. Stuart
Fisher, Miss M. L.
Fleischman, J.
Fleischmann, Mrs. L.
Fletcher, Mrs. P.
Flugge-de Smidt, R. A. H.
Foà, Mrs. Raoul
Foote, Mrs. J.
Ford, Mrs. L. D.
Ford, Mrs. D. M.
Forest Education, Director of
Forest Department (6 conservancies).
Forsyth, A.
Forsyth, Dr. R.
Foster, W. H.
*Fowler, D. S.
Fowler, Miss E.
Fox, Mrs. F. R.
Fox, H. W.
Francis, Capt. G. W.
Franklin, Mrs. J. S.
Franklin, Mrs. W.
*Frappier, E.
*Fraser, J. B.
*Frater, J. R.
Friedlander, Mrs. A.
Froembling, Dr. W.
Frost, C. C.
Frost, Miss M. E.
Frudd, H. W. D.
Fry, W. E. R.
Fuller, Dr. E. B.
Fuller, Mrs. E. B.
*Fuller, E. R.

G.

Gabbett, Mrs. P.
Gajana, Mrs. F.
Galpin, Dr. E. E.
Galvin & Sales, Ltd.
Gant, L.
Garabedian, Miss S.
Gardiner, Hon. Mr. Justice F. G.
Garland, Miss M.
GARLICK, MRS. D.
GARLICK, R. C.
Garnett, G. S. B.
Gavin, Major F. C.
*Gemquand, Miss M. E.
George Municipality.
Geyer, Dr. A. L.
Geyer, Mrs. A. L.
Gibson, T. B.
Gibson, Mrs. W. P.
Giffen, M. H.
Gill, Dr. L.
Gill, Miss M.
GILLETT, MRS. A. B.
Girdwood, W.
Girls' Central School, Cape Town.
Glennie, Mrs. E.
Gloag, D.
Godbold, Mrs. A. B.
Godbold, Miss J. D.
Godman, Dame Alice
Godman, Miss C. E.
Godman, Miss E. M.
Goldblatt, Miss S.
Golding, Miss M.
Goldman, Mrs.
GOLDSCHMIDT, MRS. L. B.
Goodman, Mrs. Gwelo
Goodman, J. A.
Goodwin, E. A.
*GORDON-HOGG, A.
Gordon, H. S.
Gordon, Dr. W. L.
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(*b*) To augment the Government grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch and Whitehill.

(*c*) To organise shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora.

(*d*) To enlighten and instruct the members on botanical subjects by means of rambles, meetings, lectures and conferences, and by the distribution of literature.

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Book Reviews.

HUTCHINSON, J.: *The Families of Flowering Plants.* II. Monocotyledons. London, Macmillan & Co. 1934. pp. x and 243. Figs. 187. 20s. 0d. net.

This volume on the classification of monocotyledons forms the continuation and completion of Dr. Hutchinson's work on the arrangement and affinities of the flowering plants. The first volume which dealt with the dicotyledons was published as long ago as 1926, and was reviewed in this JOURNAL for that year.

Every botanist must have some interest in classification, though the extent of his interest may vary considerably. Some are content with a distinction of the main groups alone. Whatever attitude is adopted, the group of the Monocotyledons is a definite and easily recognised one. There are very few plants about which any doubt can arise as to their inclusion or exclusion from this class. The monocotyledons are much less numerous and much more uniform than the dicotyledons. Whether we look at "bulbous" plants, grasses, reeds, orchids, or even palm trees, we find a common basal plan of construction both of the vegetative organs and of the flowers. Dr. Hutchinson, who sets out to trace the possible phylogeny of the plants, regards this uniformity of plan as an indication of a common origin for the whole group and an origin from a dicotyledonous ancestor.

Turning to the more detailed aspects of the classification of monocotyledons we find that the main features of the division into families have undergone very little change for a long time. The various schemes of classification that have been put forward during the last century have differed from one another more in the sequence of families and in their association one with another than in their definitions.

Some of the accepted families of Monocotyledons are among the first to be learned at the beginning of the study of systematic botany. The three families of "bulbous" plants with more or less conspicuous petaloid flowers, Liliaceae, Amaryllidaceae, Iridaceae, which are separated from one another by the numbers of stamens and the position of the ovary, are examples which anyone who has even the rudiments of botanical study, feels able to recognise. For over a century botanists have accepted unquestioned the characters used to separate these three families. Dr. Hutchinson, however, challenges this complacent attitude. He considers that the commonly used characters are not really natural ones, in the sense of indication of real relationships, but are a survival from the days of Linnaeus in his useful but admittedly quite artificial system. In a scientific classification which aims at grouping plants together in accordance with their origins, and not merely separating them from one another, a different set of characters must be emphasised. Dr. Hutchinson decides that the position of the ovary, for example, is of much less importance as an indication of affinity than other features such as the type of inflorescence. A plant such as *Agapanthus* he regards as much more nearly allied to the Belladonna Lily than to the Chincherinchee, in spite of the position of the ovary. He groups together the plants with umbellate scapose inflorescences and basal leaves, most of which have bulbs, into one family to which he gives the name Amaryllidaceae. In its new guise this family is a very uniform group, as he excludes those plants such as *Agave* with spicate inflorescences and woody stems. This is probably the most drastic change made. Others are the result of making the limits of the families smaller and re-arranging their sequence. The Iridaceae are maintained as a natural group with practically their accustomed limits.

It is always upsetting when old-established arrangements are put aside, but the scientist should never allow that natural conservatism which all possess in a greater or less degree to influence his judgments. Dr. Hutchinson in this volume gives a number of reasons for his attitude and very clear definitions of his new arrangements. Whether his scheme is finally accepted or not, it is an important contribution to systematic botany which deserves the most careful consideration by botanists.

The book is well illustrated. The types selected are not generally common well-known plants, but examples that illustrate the conclusions of the Author.

R. S. ADAMSON.

ARBER, A.: *The Gramineae.* A study of Cereal, Bamboo and Grass. Cambridge University Press, 1934. pp. xvii and 480. Frontispiece and 212 figs. 36s. 0d. net.

It is scarcely an exaggeration to state that the whole of civilisation and wealth are based upon grass. Indeed, that human life is ultimately dependent on grasses, must be admitted as true.

Under the term grass are comprised not only those plants commonly known as such which form the pastures, meadows and lawns of the world, but also many others of the most essential value to man. All the varieties of grain, the cereals, are grasses. Wheat, barley, oats, mealies, rye, kaffir corn, rice and many others which form the world's staple food are grasses. Sugar cane is another. Less obviously grass-like are the bamboos of the tropics, which have innumerable uses as shown by the author of this book. Still other grasses provide such things as the mosquito deterrent known as citronella oil.

The grass family or Gramineae is a very large one, comprising some 550 genera and over 8,000 species. Grasses are found in every part of the world, and in every kind of habitat. Systematically the Gramineae are somewhat specialised, and have been regarded as the highest type reached in the evolution of the monocotyledons.

This huge family with its enormous importance for human life has received more study from botanists than any other single one. As Mrs. Arber points out, the literature on grasses, if brought together, would constitute a library in itself. In the present volume, in which attention is confined to the historical aspect of grasses and to their morphology and anatomy, a bibliography which extends over 44 pages is included, which will give some notion of the extent of published work dealing with these plants.

With this enormous amount already written, it might be questioned whether there is room for a new work, and especially for one which quite distinctly avoids the attempt to summarise in encyclopaedic form what is already known. Mrs. Arber has, however, amply justified the production of yet another book on grasses. It is a subject on which she has specialised for a number of years, and a very large amount of the contents is an expression of the results of her own work.

The volume as a whole is one probably more suited to the trained botanist than to the general reader, though there is much in it of interest to anyone, whether botanist or not. The data on the history of cereal cultivation, which occupy the opening chapters, are of quite general interest and importance. It is noteworthy that of the food grasses, all are annuals, and none is known to exist in its present form in a wild state; indeed, the origin of many, for example mealies, is very obscure. The chapters on the habits and uses of the bamboo are also very easily read and appreciated by anyone. While much of the remainder is rather technical, there occur throughout historical and general passages of much interest to the lay reader.

The book is freely illustrated. The majority of the figures are from the author's own drawings and illustrate details of morphology and structure. As most of the figures comprise several drawings, the illustration is very full. In some cases the grouping together of small drawings has been a little overdone and clearness is lost.

In addition to the author's drawings there are a number of reproductions of early illustrations, some of which are botanically most accurate. These are largely from mediaeval herbals, but there are included reproductions of a Greek coin and of an Assyrian relief. The frontispiece is an excellent reproduction in colour of Dürer's exquisite drawing of a sod of grass turf.

The book as a whole is not a very easy one to read through. There is a wealth of detail that makes rapid assimilation far from easy. Throughout the book the author deliberately avoids what may be termed "text book" presentation of material, but in so doing is apt to make an assumption of detailed knowledge that is scarcely justifiable for others than the advanced worker. At other times the selection of material from an enormous mass has resulted in a somewhat sketchy effect on the reader.

In spite of these minor faults, the book is one of importance not only from the intrinsic interest of the subject, but also in bringing together the results of many years' study by its author.

R. S. Adamson.

White, A. and Sloane, B. L.: *The Stapelieae*. pp. xii + 206, folding map, coloured frontispiece, and 236 photographic and other illustrations.

The Stapelias or carrion-flowers are some of the most familiar of South African indigenous plants. They make no show of colour and do not contribute to the landscape; they are dumpy and ungraceful in their growth, and they have no charm of odour, quite the reverse. Yet no plants awaken greater interest. Inconspicuous and difficult to find, liable to maddening catastrophes in cultivation, not greatly diversified in vegetative form, they richly repay every trouble by their miraculous flowers. The blooming of any Stapelia is an event in the amateur's calendar, a matter for the calling in of neighbours and brother enthusiasts.

Our knowledge of the Stapelieae has been very largely built up from the work of amateurs; a great proportion of the specimens available for the study of botanists and preserved in herbaria have been derived from plants which have flowered in the gardens of private individuals who have been captivated by the attraction of these strangest of plants.

Alain White and Boyd Sloane have approached the Stapelieae as amateurs, but they have gone further. With true scientific fervour and determination they have set themselves to learn and record all that is known about their subject. In their garden at Pasadena, California, in a continent entirely devoid of Stapelieae in the wild state, they have got together a remarkable collection of living specimens. Judging from the photographs with which their book is so richly adorned, they have been singularly successful in the difficult art of cultivating these plants, and their chapter on methods will accordingly be read with great interest.

The book aims at completeness, but does not include the precise botanical descriptions which are to be found in such monographs as those of Dr. N. E. Brown. The authors, however, present a large number of admirable photographs and drawings illustrating the majority of the known species, and they also give brief descriptions with notes on the discovery and history of the plants, the localities in which they are found, and the principal characters by which they are distinguished from their congeners.

An interesting feature is the table of geographical distribution of the various genera. This shows that the Cape Province is the principal home of the Stapelieae, with twelve of the seventeen genera, and with South-West Africa as a good second. Some of the genera are narrowly localised; others extend over a very wide area; for instance, Huernia, which ranges from Mossel Bay to Arabia, and

Caralluma with about 90 species dispersed all over Africa, Arabia and India, and overflowing into Spain, Afghanistan and Burma.

Another feature of great value is the collection of short biographies and notes on the various persons — botanists, collectors, explorers, monographers, and amateurs — who have in some way or other contributed to knowledge of the Stapelieae. This brings together a quantity of interesting personal and general data, including several portraits, and is a most useful addition to the rather scanty and scattered information available about the personalities behind South African botany. The appendices on Heurnius, Witsen and Hermann and their colleagues are particularly valuable on account of the greater amount of detail included in them.

In this splendid work we behold the spectacle of overseas workers being enabled through private generosity adequately to study and to publish their results on South African plants, while in South Africa itself the workers have few opportunities and meagre endowments. From the point of view of the acquisition and presentation of knowledge we owe much gratitude to Mr. White and Mr. Sloane, and congratulate them heartily on the admirable book they have produced.

"The Stapelieae" can be purchased direct from the White and Sloane Stapelia Collection, 1421 Dominion Avenue, Pasadena, California, U.S.A., price 3 dollars.

R. H. COMPTON.

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